

ROADMASTERS' NUMBER

October, 1931

Railway Engineering and Maintenance



"STEAD"
TRUE TEMPER
RAIL ANCHOR
Initial and Application
Costs Low

THE AMERICAN FORK & HOE COMPANY

General Offices: Cleveland, O. Factory: North Girard, Pa.

District Offices

253 Broadway, New York City - Daily News Plaza, Chicago, Ill.

Representatives at

Boston, Denver, Detroit, Louisville, Minneapolis, St. Louis and San Francisco

Foreign Representatives

Woolham, Inc., 44 Whitehall St., New York City, and 68-72 Windsor House, Victoria St., London, S.W.-1

A dream that came true . . .



*forecasting a
greater railway
service*

THE MILLIONS invested in the Union Terminal development in Cleveland is concrete evidence of a great faith in the future of railroads and railroad men.

Roadmasters and maintenance of way men will see in this tremendous development a sharp contrast to terminal facilities of 50 years ago—when the Roadmasters' Association was born. Materials and methods in railroad construction of 1880 and 1931 show as great a contrast.

The track system of the Terminal can be seen at the right of this aerial view, and at the left the Terminal Group of buildings which house the executive offices of the Chesapeake & Ohio, Erie and Nickel Plate Railroads.

THE
RELIANCE MANUFACTURING CO.
MASSILLON, OHIO
Engineering Materials, Ltd., McGill Bldg.
Montreal, Quebec, Canada



Railroads using the Cleveland Union Terminal facilities are New York Central, Big Four and the Nickel Plate.

HY-CROME

Reg. U. S. Pat. Office

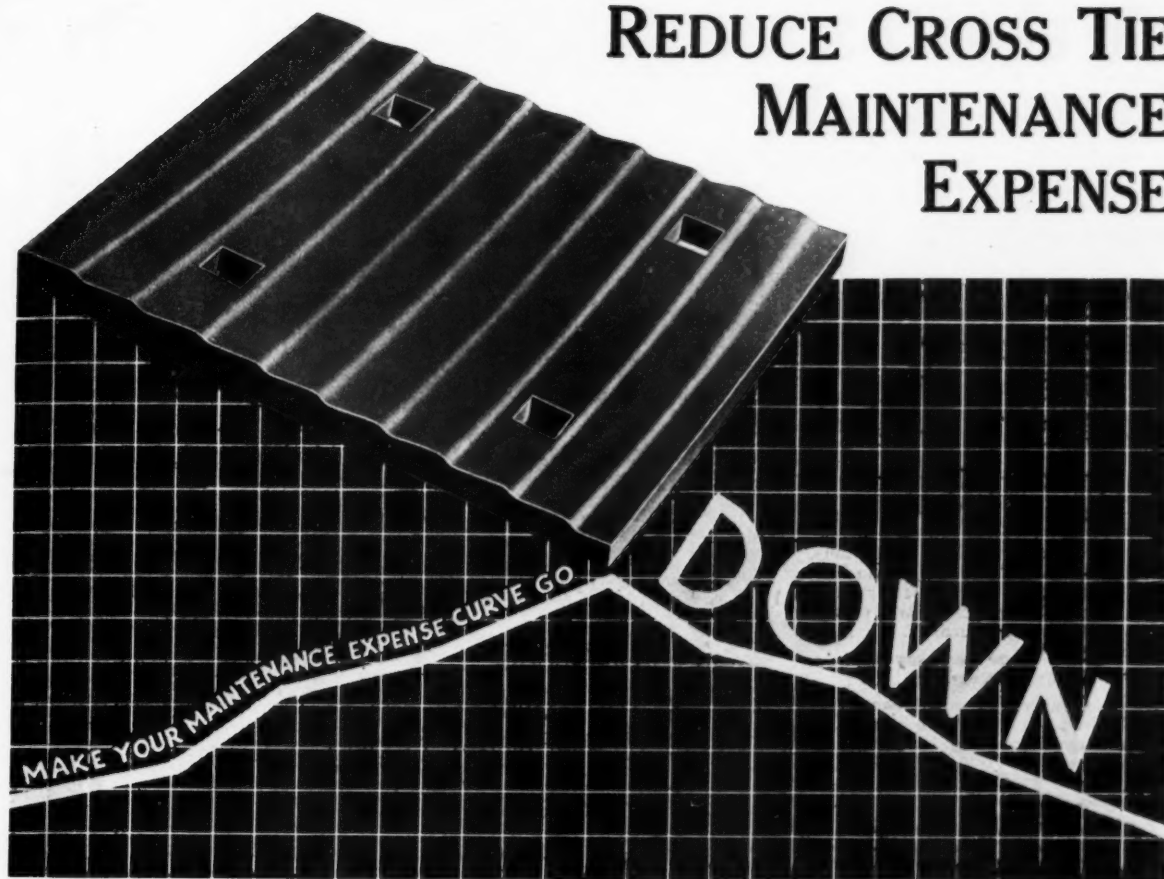
RAILWAY ENGINEERING AND MAINTENANCE

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REDUCE CROSS TIE MAINTENANCE EXPENSE



Insure Maximum Tie Life and Minimum Tie Renewals

RAILROADS using Lundie Tie Plates are now reaping big benefits in the form of reduced tie renewals. These roads have a decided advantage during the present economic crisis—because they have reduced their annual tie renewals year after year to a point where they are now realizing worth-while savings in cross-tie maintenance expense.

The savings accruing from Lundie Tie Plates are cumulative. They get bigger and bigger each year as more Lundie Plates are placed in track and

consequently tie-renewals become fewer and fewer. The tie-renewal curve and the tie-maintenance expense curve are definitely downward.

The Lundie Tie Plate gives superior service because it is more than just a tie plate—it is a tie protector. The complete elimination of sharp tie destroying projections protects ties against mechanical wear and assures 100 per cent service-life from treated ties. Millions in service prove this.

Low first cost and assured returns make this an economic device of the highest order.

The Lundie Engineering Corporation

285 Madison Avenue, New York
59 East Van Buren Street, Chicago

LUNDIE

TIE PLATE



For Full-time Wide Burning

(Above) Where "wide" burning is sufficient to keep one unit busy all the time, the Fairmont Open Type 6-Burner model is recommended. Has 4 swing burners, and two burners under wings. Can burn track weeds—also efficient for snow melting around switches. Saves cost of oven and four hood burners.

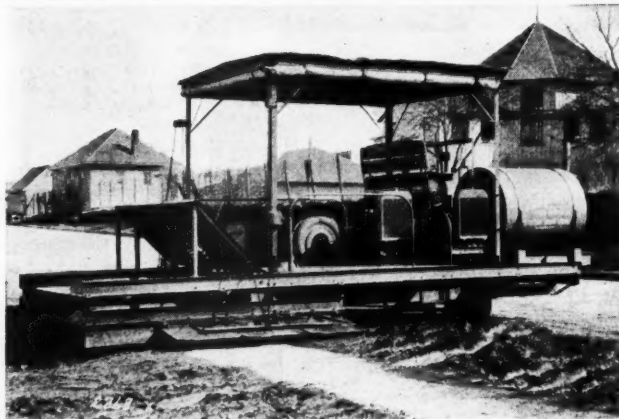
For Full-time Roadway and Track Burning

(At right) Fairmont Ten-Burner model has highest efficiency for both requirements. Four burners under hood, two under wings, give 16-foot track burning width. Four swing burners adjustable throughout 46-foot range.



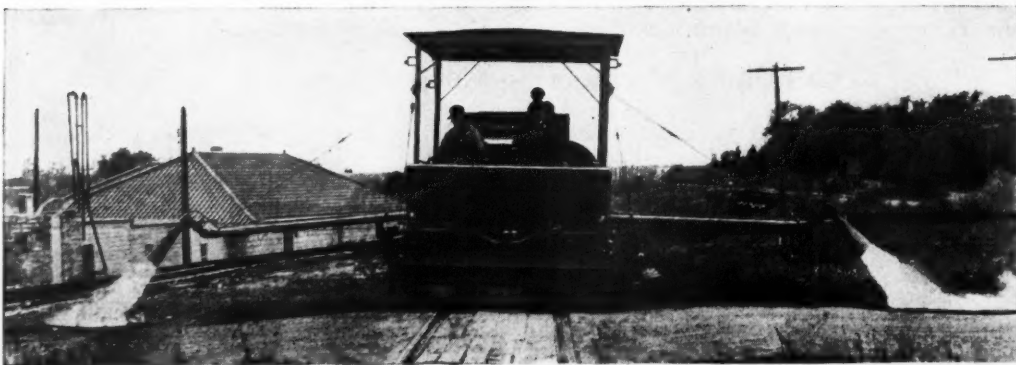
For Fastest, Lowest-Cost Track Burning

(At right) The Fairmont Hood Type 6-Burner is indisputably the most efficient equipment for track burning. The nine foot long oven surrounds weeds with flame four times longer than does the open type burner. Doubles track speed—reduces fuel consumption. Swing burners can be applied, if desired.



For Occasional Wide and Track Burning

(Below) At minimum cost, the Fairmont Eight-Burner gives the opportunity of combining swing burners with the lower cost of oven track burning. Has 2 swing burners, two burners under wings, and the famed Fairmont 4 burner oven for track work. The swing burners cover a 46-foot spread—efficient equipment for thawing out frozen switches, and quickly cleaning out cuts and ditches.



THE RAILROAD WORLD

HERE *is*

FAIRMONT'S ANSWER

To Your "Burning Question"

Obviously *one* type and size of weed burner cannot economically serve all railroads of different sizes and operating under different climatic conditions—

—that is why Fairmont offers you a *complete* line of proved weed-burning equipment, containing just that model best adapted to meet your specific conditions of service.

All Fairmont M27s are self-powered with two motors of 35 to 40 horsepower, have electric starter and headlights front and rear. The Swing Burner Nozzles are welded of superior heat-resisting steel. Calorizers and all other nozzles seldom need replacement.

While burning is the most effective method of clearing right-of-way of weeds, there is a wide variation in the efficiency and economy of present weed-burning equipment.

Be safe, therefore—and before ordering any equipment at any price, consult a Fairmont representative.

FAIRMONT RAILWAY MOTORS, INC.

FAIRMONT, MINNESOTA, U. S. A.

General Sales Offices: 1356 Railway Exchange Building, CHICAGO

District Sales Offices:

New York City Washington, D. C. St. Louis San Francisco

FAIRMONT RAILWAY MOTORS, Ltd., Toronto, Canada

Foreign Representative: THE BALDWIN LOCOMOTIVE WORKS

Manufacturers of section motor cars, inspection motor cars, gang and power cars, weed burners, mowers, ballast discers, ball and roller bearing engines, push cars and trailers, roller axle bearings, wheels, axles and safety appliances

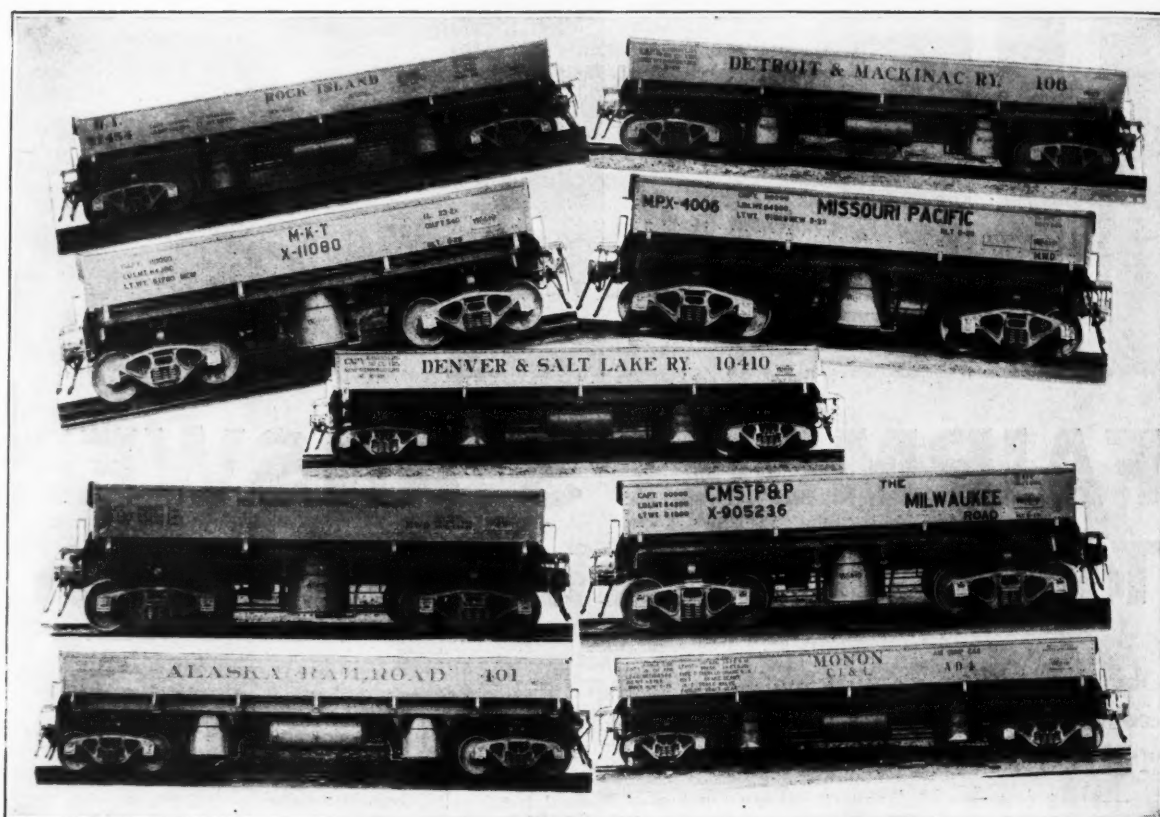


The Fairmont Fire Patrol

Addition of a Fairmont Fire Patrol to your weed-burning equipment will not only extinguish every trace of fire, but will greatly speed up the work of the weed burner and eliminate the necessity of following burner with section crew. Unit consists of a Fairmont Fire Patrol Car equipped with 4 H. P. governed engine belted to a rotary pressure pump, with one extra Fairmont 450-gallon Tank Car. A Fairmont A6 extra gang car (Ford model "A" engine) is recommended to carry crew and draw Fire Patrol Unit. Ask for prices.



K N O W S F A I R M O N T



FURTHER COST REDUCTIONS CAN BE MADE



Western Drop Door cars are built in all standard sizes. Their operation is safe under all conditions. They afford complete protection to track and ballast in dumping. They operate with utmost economy.

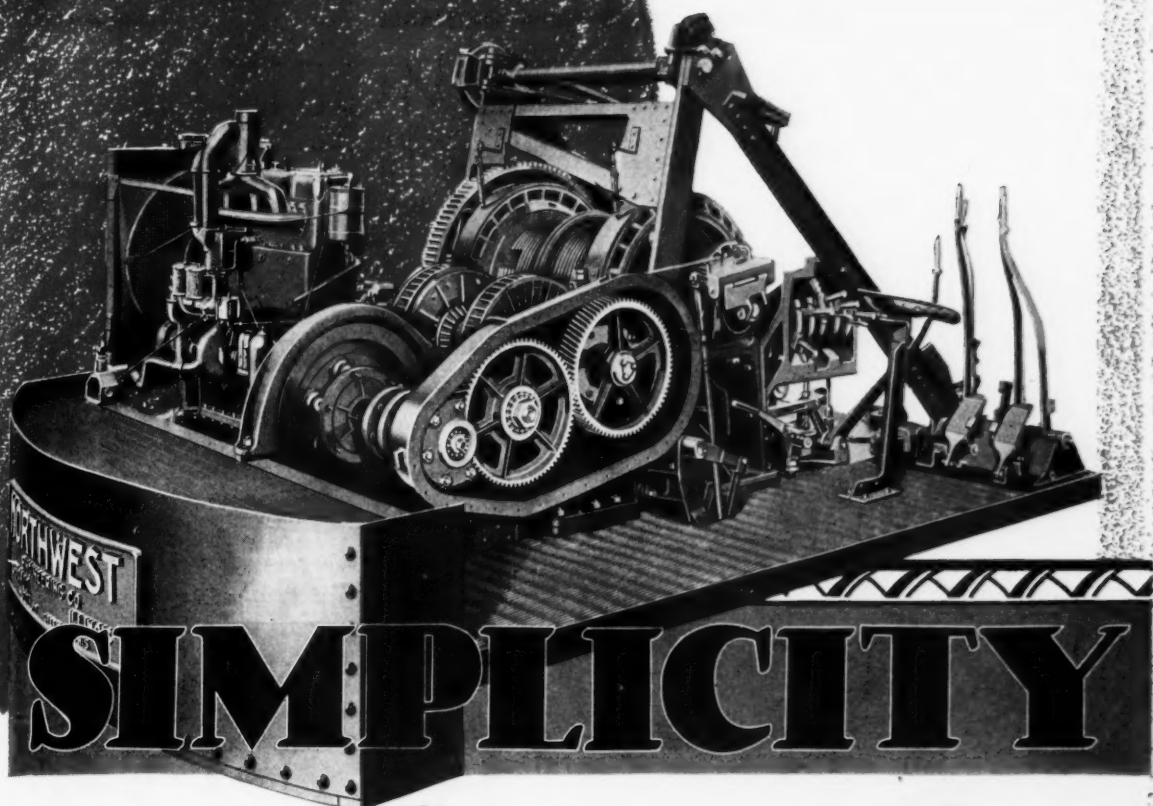
For instance, in maintenance-of-way the cost of the transportation of material can be reduced by the use of Western Drop Door Dump Cars. Railroads using Western cars, some of whose stencils appear above, have this cost down to rock bottom.

Western Drop Door Dump Cars are noted for strength, safety, and both low cost operation and upkeep. They are making remarkable records wherever they are used. Why not investigate? Catalog 81-A, giving complete description, is yours for the asking.

Western Wheeled Scraper Company

Aurora, Illinois, U. S. A.

WESTERN



SIMPLICITY *makes the Northwest worth more*

COMPARE the Northwest crawler with other machines! Simplicity of design is one of its valuable features.

Follow the line of power through the helical gear drive to the operating mechanism. Note that there are only two main shafts above the deck. Note that all high speed shafts are mounted on ball bearings. Note that the A-frames do not support the drums. All mechanism is back of the center pin and mounted low for stability—and the whole is mounted on a single heavily webbed steel casting.

Here is *simplicity*—freedom from chains, piping, unnecessary gears and shafts! Here is ease of upkeep that keeps operating costs down.

One of the reasons why 42% of the crawlers sold to railroads are Northwests.

NORTHWEST ENGINEERING CO.

The world's largest exclusive builders of gasoline, oil burning and electric powered shovels, cranes and draglines

1713 Steger Building 28 East Jackson Boulevard
Chicago, Illinois, U. S. A.

Erecting steel for
bridge work on the
M. K. & T.



*The Standard
by which shovels
and cranes
are measured*

NORTHWEST

MORE MACHINE FOR THE DOLLAR INVESTED!

REM 10 Gray



SAVE YOUR RAIL ENDS

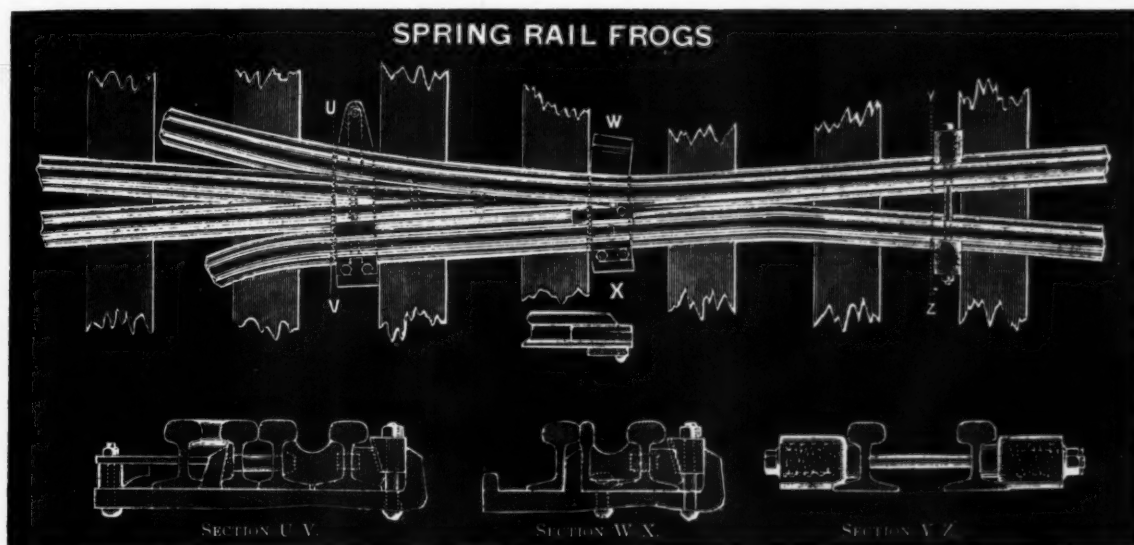
The Rail Joint Company
165 Broadway New York, N. Y.

HEADFREE RAIL JOINTS

PETTIBONE MULLIKEN CO.

4710 West Division St.

CHICAGO, ILL.



50 Years Ago » »

This was a standard up-to-date spring frog. They were coming into use just about then because the railroad man had discovered that "they made his track ride smoother". The railroads were young and 67 lb. and 70 lb. rail was considered heavy main line rail.

Today » »

The roadmaster still wants his track to ride smooth, but the increase in power, length and weight of train, speed and heavier rail section, makes it necessary for him to use modern up-to-date track equipment such as:

ARTICULATED MANGANESE CROSSINGS

ONE PIECE MANGANESE GUARD RAILS

MECHANICAL SWITCHMAN

HUB SAFETY STANDS

NO. 6 HIGH STAR STANDS » » FOR MAIN LINE

NO. 2 HUB STANDS » » FOR YARD AND SIDE TRACKS

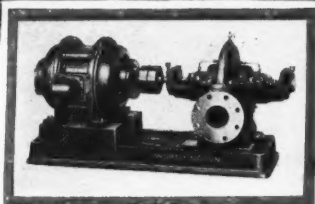
MODERN TRACK WORK IN OPEN HEARTH AND
MANGANESE CONSTRUCTION

We are ready to serve you today as we did 50 years ago

PMCO manganese steel, carbon and alloy steels, grey iron and semi steel are all made in our own electric furnaces.

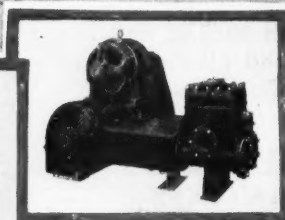
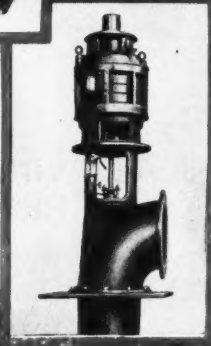
Dipper teeth, dipper fronts, racks, etc., for power shovels, dredges and drag lines, are all manufactured and supplied by us.

SEND US YOUR INQUIRIES

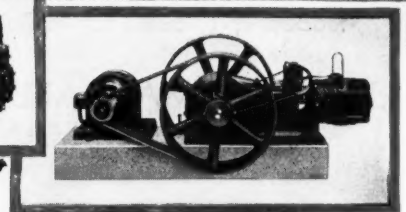


Worthington Ball Bearing
Centrifugal Pump

Worthington
Deep Well Pump



Worthington
Power Pump



Worthington
Stationary Compressor
with Multi-V-Drive



Worthington
Rock Drill



Worthington
Pavement Breaker



Worthington
Clay Spade



Worthington
Trench Digger

Worthington
Backfill Tamper

METALWELD-WORTHINGTON

becomes

WORTHINGTON



*to round out our service to
Railway Construction and Maintenance*

FOR eighty-six years Worthington has built pumps; for forty-one years, compressors. Last year the Gilman line of contractors air tools and rock drilling equipment became a member of the Worthington family.

And now . . . to further extend this group of equipment for railroads, contractors, public utilities and industrial plant maintenance . . . the Metalweld-Worthington line of portable air compressors has been added.

Worthington Compressors have been used exclusively in Metalweld-Worthington portable units, and have been recognized as an important factor in building world-wide prestige for this equipment.

Present users are assured of the unlimited backing of the Worthington organization. To the railroads and industry at large we offer an improved line of quality compressors in a wide

range of sizes . . . for rail car, trailer, motor truck, tractor and semi-portable mountings; also a complete group of contractors air tools, including rock drills, pavement breakers, clay spades, trench diggers, backfill tampers, drill steel, air hose and all accessory equipment.

Back of this equipment are the traditions of the Worthington organization. The advantage to the buyer is obvious . . . one source of supply with *One Policy of Complete and Undivided Responsibility* for the successful operation of pumps, compressors, air tools and accessories. Equipment users have learned the significance of Worthington's broad protective guarantees. Worthington products *must* deliver the performance promised for them.

A nation-wide organization of Worthington district offices and representatives will engineer, distribute and service this expanded line of products.

ATLANTA
BOSTON
BUFFALO
CHICAGO
CINCINNATI
CLEVELAND
DALLAS
DENVER
DETROIT
EL PASO
HOUSTON
KANSAS CITY

COMPRESSORS	
<i>Portable and Stationary</i>	
ROCK DRILLING EQUIPMENT	
Rock Drills	
Contractors Air Tools	
Drill Steel and Accessories	
Automatic Heat Treating Machines	
Forging Furnaces	
MULTI-V-DRIVES	
PUMPS	
<i>Centrifugal...Steam...Power Rotary...Deep Well</i>	
FEEDWATER HEATERS	
CONDENSERS and Auxiliaries	
METERS	
<i>Water...Grease Oil...Gasoline</i>	
DIESEL ENGINES	
GAS ENGINES	
CHROMIUM PLATING	
<i>Literature on request</i>	

ST. PAUL
SALT LAKE CITY
SAN FRANCISCO
PHILADELPHIA
PITTSBURGH
ST. LOUIS
LOS ANGELES
NEW ORLEANS
NEW YORK
SEATTLE
TULSA
WASHINGTON

Branch Offices or Representatives in Principal Cities throughout the World

WORTHINGTON PUMP AND MACHINERY CORPORATION

Works: BUFFALO, N.Y. CINCINNATI, OHIO HARRISON, N.J. HOLYOKE, MASS.

Executive Offices: 2 PARK AVENUE, NEW YORK, N. Y. General Offices: HARRISON, N. J. G-95

FIX RESPONSIBILITY ON ONE RELIABLE MANUFACTURER . . . WORTHINGTON

OXWELD

means faster repairs

A PROMINENT labor leader, in a recent article in The New York Times, says: "Repairs which before the introduction of the oxy-acetylene welding process took eight men three weeks for one locomotive can now be done in from three to seven hours with a force of not more than four men."

Oxy-acetylene welding speeds repair work and reduces its cost because it makes the ordering and stocking of replacement parts unnecessary. By fusing the damaged members into a permanently solid unit, it produces a joint that is as strong as, or stronger than, the metal itself. It can be used on iron, steel, aluminum, copper, lead, brass, bronze, and many ferrous and non-ferrous alloys.

Oxy-acetylene cutting provides a quick, easy way to cut steel and iron to shape, to demolish steel and iron structures, and to increase the value of scrap by cutting it into charging box sizes.

For nineteen years, The Oxweld Railroad Service Company has contributed to the efficiency of American railroads by providing them with the best methods and materials for oxy-acetylene welding and cutting. Year after year, the majority of Class I railroads are finding Oxweld Railroad Service of increasing value.



THE OXWELD RAILROAD SERVICE COMPANY

Unit of Union Carbide and Carbon Corporation



NEW YORK, Carbide and Carbon Building

CHICAGO, Carbide and Carbon Building

A Bird's-Eye View of the Tie Adzing Problem

Here's a bird's eye view of three Nordberg Adzing Machines manned by three men easily keeping ahead of a big gang—adzing every tie to the same level and plane.

This means better track not only after it is just laid, but a month later—a year later—five or ten years later. No torsional stresses in rails occur, no re-gauging is necessary, no tipping in or out under traffic as with uneven hand-adzed tie seats.

Track properly laid on Nordberg adzed ties is permanently laid—there is no "back work."

Future maintenance expense is materially reduced.

Other Nordberg Machinery developed for your track maintenance jobs: Power Jack—Spike Puller—Rail Drill—Track Shifter—Rail Cross Grinder.

Railway Equipment Department

NORDBERG MFG. CO.

MILWAUKEE, WIS.

FIVE TO ONE

Chemical treatment offers one of the biggest opportunities to reduce expenses

It's the cheapest and most effective method of weed elimination

CLEAN UP WEEDS NOW FOR FALL INSPECTION—

AND prevent their growth next spring. Chemical applications made during the Fall months kill existing plants and prevent regrowth.

One man with Atlacide and the Chipman Knapsack Duster kills more weeds permanently than five men can remove by hand with only temporary and superficial results.

Order Dusters and Atlacide now. Get after those scattered weed patches. The initial cost is low and the results are great.

You, in charge, will be highly commended after Fall inspection, not only on the fine appearance of your sections—but how much good you have done with so small an expenditure.



Chipman Chemical Engineering Co. Inc.
BOUND BROOK, N. J.

Chicago, Ill. Palo Alto, Cal. Houston, Tex. Atlanta, Ga. Kansas City, Mo. Winnipeg, Man.



For Railway Bridge and Building Work

"Wolf" Saw and electric drill operating from "Universal" 10 K.V.A. Portable Motor Generator Plant by the C. & N. W. near Sioux City, Ia. An ideal equipment for small gang operation. Readily portable by mounting on ordinary push car. Provides 110 or 220 volts, 60 cycle, 3 phase service for saw, boring tools and lights for night work. "On basis of \$2,500.00 cost with tools this outfit will show annual saving after repairs, depreciation and interest on investment of not less than 50% of its cost."

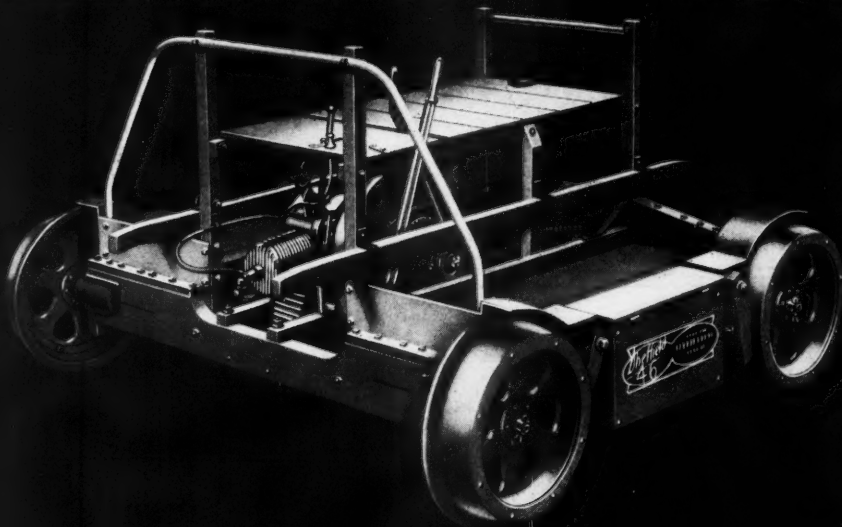
Over 500 electric and air driven "Wolf" Saws now serve the Railroad, Mining, Marine, General Construction and other fields.

REED-PRENTICE CORPORATION
Worcester, Mass., U. S. A.
Offices: Detroit, Mich., New York City
Agents in principal cities

(Above) Cutting out piling
(Right) Drilling chest bolt holes
(Below) Framing 8"x16" for timber

WOLF Portable Timber Sawing Machine

FIRST ON THE RAILS—AND STILL FIRST



The new Sheffield No. 46 weighs less than 400 pounds. Lifting weight only 100 pounds!



“Sheffield”

The greatest value in railway motor cars

Sheffield Motor Cars are the *lowest overall* cost cars on the market. Therefore they cannot always be the lowest *priced*.

They are built with every economy known to modern production methods in America's most completely equipped railway motor car manufacturing plant. Economies of this sort include none which impair efficiency and dependability.

If a car the equal of Sheffield is ever produced—the Sheffield will be lower priced. Sheffield purchasers are assured of the greatest dollar-for-dollar value in railway motor cars. Ask us to prove these claims.

Sheffield Motor Cars

The complete Sheffield line includes the following models. Write for complete information about any or all of these *lowest overall* cost cars.

Sheffield No.	32	—Section Car
“	33	—Section Car
“	36	—Signal and Maintainer's Car
“	40B	—Heavy Section, B. & B. Extra Gang Car
“	41	—Roadmaster's, Supervisor's and Signaller's Car
“	44B	—Section and B. & B. Car
“	45	—Section Car
“	46	—All Light Service Car
“	700	Series Section Cars

FAIRBANKS, MORSE & CO., Chicago

Manufacturers of railway motor cars; hand cars; push cars; velocipedes; stand pipes for water and oil; tank fixtures; stationary and marine oil engines; steam, power and centrifugal pumps; scales; motors and generators; complete coaling stations.

FAIRBANKS-MORSE

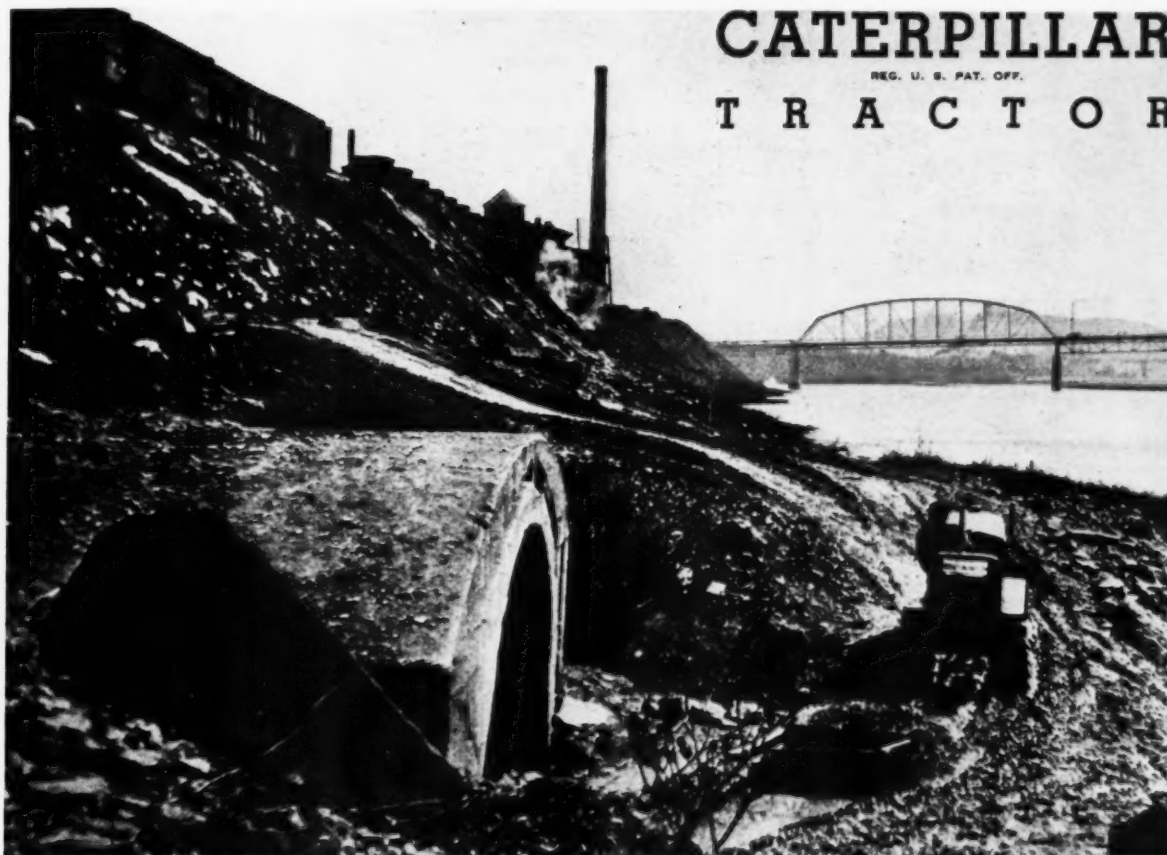
Motor



Cars

First on the rails—and still first

5549-RA21.80



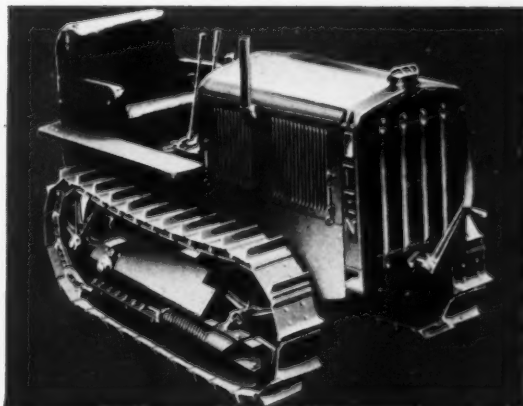
CATERPILLAR

REG. U. S. PAT. OFF.

T R A C T O R

The "Caterpillar" cleans a CULVERT

THIS 432-foot culvert on the Pennsylvania Lines needs cleaning every few years. This year the job was done with a "Caterpillar" Ten Tractor and a $\frac{1}{2}$ -yard scraper — men, money and minutes were saved. Constantly, railroad men are finding new ways to employ the power of this versatile tractor on countless jobs of construction and maintenance — earth-moving, mowing weeds, plowing fire-breaks, pulling ties, providing power for tractor-mounted winches, booms, air compressors. There's a job, perhaps many jobs, on your road that "Caterpillar" Tractors can do better, quicker, cheaper.



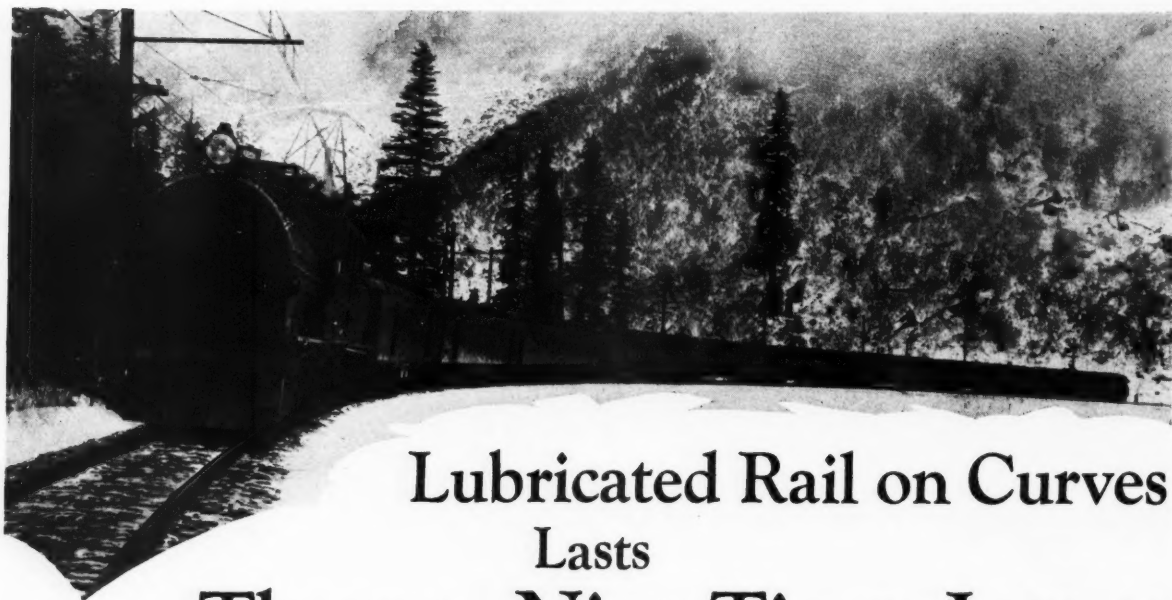
Caterpillar Tractor Co.

PEORIA, ILLINOIS, U. S. A.

Track-type Tractors Combines Road Machinery
(There's a "Caterpillar" Dealer Near You)

Prices—f. o. b. Peoria, Illinois

TEN	\$1100	TWENTY	\$1900
FIFTEEN	\$1450	THIRTY	\$2375
SIXTY	\$4175		



Lubricated Rail on Curves Lasts Three to Nine Times Longer

WHAT would it mean in dollars and cents if the steel on your curved track could be made to last from three to nine times longer?

Records compiled by two railways demonstrate conclusively that rail head wear on lubricated curves ranges from one-third to one-ninth of that which took place before lubrication—as far as head wear is concerned the life of these lubricated rails is prolonged from three to nine times!

By the use of Mexican Graphite Curve Grease you can effect just such economies.

And, the cost is comparatively insignificant—because

Mexican Graphite Curve Grease does not have to be frequently applied—it does not run off the rail—it sticks persistently through rain, snow or sleet—and regardless of heat or cold it continues to provide perfect lubrication.

Furthermore, the graphite in Mexican Graphite Curve Grease is in a very finely powdered form. The rubbing action of wheel flanges embeds these fine particles into the steel—exactly where the flange bears against the rail head—thus insuring a smooth, lubricated surface long after the grease itself has entirely disappeared.

The United States Graphite Company SAGINAW, MICH.

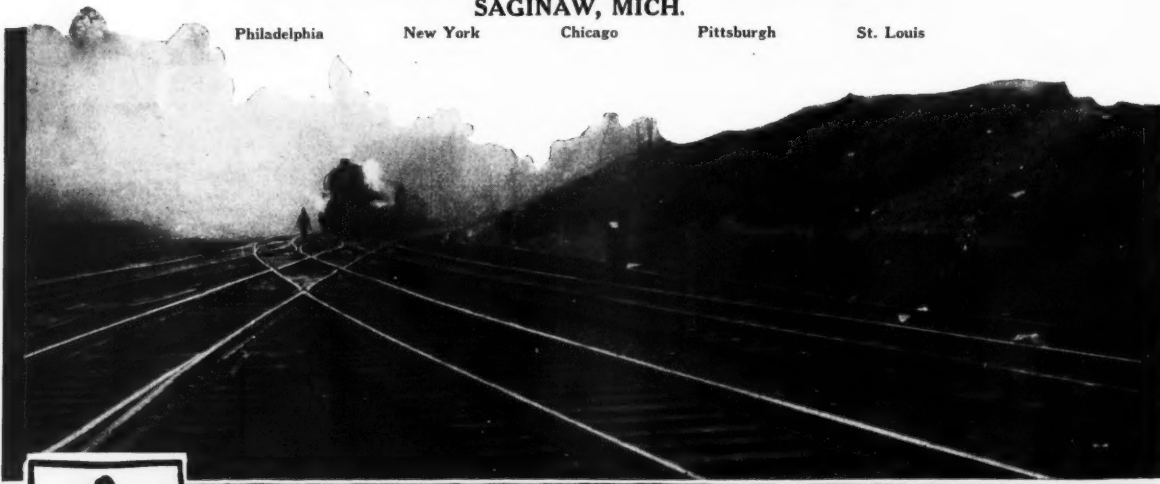
Philadelphia

New York

Chicago

Pittsburgh

St. Louis



Mexican Graphite Curve Grease
SAVES RAILS - REDUCES FLANGE WEAR



Ingersoll-Rand labor-aiding appliances for rail-laying operations



4 Ingersoll-Rand Pneumatic Spike Pullers being used with an Overhead Tool Carrier mounted on a Size 9x8 Tie Tamper Compressor.

Pulling 40 Spikes a Minute *with Pneumatic Spike Pullers*

The use of Ingersoll-Rand SP9 Spike Pullers makes possible a fast and low cost rate of work on this operation. 4 men operating these tools in connection with an Overhead Tool Carrier mounted on a Tie Tamper Compressor (as shown above) can average 40 spikes pulled per minute or ten spikes per minute per puller. Compressed air does the work, the overhead carrier holds the weight of the tool, and the men need only guide

the puller to the spike and turn on the air. And the spikes are pulled without bending!

The Pneumatic Spike Puller is only one of the many Ingersoll-Rand labor-aiding air tools that have been developed to save time and money on track work. There are Spike Drivers for cut spikes, Screw Spike Drivers, Pneumatic Wrenches, Rail and Bonding Drills, Wood Borers, Tie Tampers, Pneumatic Grinders, and many others. Why not ask for complete information on all these tools.

INGERSOLL-RAND COMPANY - 11 Broadway - New York City

Branches or distributors in principal cities the world over
For Canada Refer—Canadian Ingersoll-Rand Co., Limited, 620 Cathcart Street, Montreal, Quebec.

Ingersoll-Rand

290-TT

The Q & C Self Adjusting Sliding Type Derail



*Advantages Found
in this New Derail*

The Q & C Self Adjusting Sliding Type Derail offers economies and efficiencies heretofore unknown in derails. This new derail has five distinct advantages as follows:

1. It will automatically adjust itself to all rail sections.
2. This permits a big reduction in inventories and eliminates confusion in the Stores Department.
3. All blocks and housings are interchangeable.
4. Base plates are cast integral with the housing, assuring a perfectly aligned derail and eliminating adzing and shimming the ties.
5. Tie strapping and braces on the outside of the rail are eliminated, reducing extra work and cost on each installation.

The Q & C Company, 90 West St., New York
CHICAGO -- -- ST. LOUIS



*We will be glad to
demonstrate the superi-
ority of this Derail by
actual test on your rail-
road.*

CONSTANT PROGRESS MAKES BETTER RAILROADING

What the work sheets tell

*about the versatility of Bucyrus-Erie
cranes and excavators*

Uses of Crawler Excavators

1. Cleaning and deepening stream beds
2. Cleaning ditches
3. Levee repair
4. Drainage ditching
5. Setting culverts
6. Handling less than carload containers
7. Collecting and handling scrap iron with magnet
8. Grading new line or second track
9. Grading for sidings
10. Widening shoulders
11. Widening cut
12. Grading classification yard
13. Loading grade material into cars
14. Raising track
15. Driving piling
16. Excavating for bridge piers
17. Excavating water storage reservoir
18. Erection of tanks and structural work
19. Ditching for drains
20. Erecting signal tower
21. Stripping and loading gravel
22. Unloading and loading ties
23. Handling supply train material
24. Cleaning ballast
25. Laying rail
26. Setting bridge timbers
27. Track shifting
28. Distributing rail
29. Coal handling
30. Handling aggregate material
31. Loading and unloading ballast



Literally, there is a different way for each day of the month to use that caterpillar-mounted convertible crane, clamshell, dragline and shovel.

Here are 31 uses — an incomplete list taken from actual work sheets and reports of several railroads.

To make this type of equipment so widely successful, Bucyrus-Erie has developed a complete line — every size, type and power. Into each is built unusual strength . . . simplicity . . . low upkeep and operating economy . . . stability . . . ample power . . . high speed.

Investigate these versatile, cost cutting machines for your work.



BUCYRUS-ERIE COMPANY

South Milwaukee, Wisconsin

Representatives throughout the U. S. A. *Branch Offices:* Boston, New York, Philadelphia, Atlanta, Birmingham, Pittsburgh, Buffalo, Detroit, Chicago, St. Louis, Kansas City, Mo., Dallas, San Francisco. Offices and distributors throughout the world.

Practical Books that will Help Maintenance Men Do Better Work



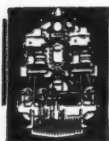
for engineers — Track and Turnout Engineering

By C. M. KURTZ
Engineer, Southern Pacific Com-
pany

This new handbook for loca-
tion, construction and mainte-
nance of way engineers, transi-
tmen and draftsmen, gives prac-
tical mathematical treatment of
track layout and other problems.
These are **fully exemplified** and
worked out in detail, and illus-
trated with drawings of accepted
designs for fixtures and track
layouts. It contains original as
well as a complete set of stand-
ard railway engineering hand-
book tables. All computing

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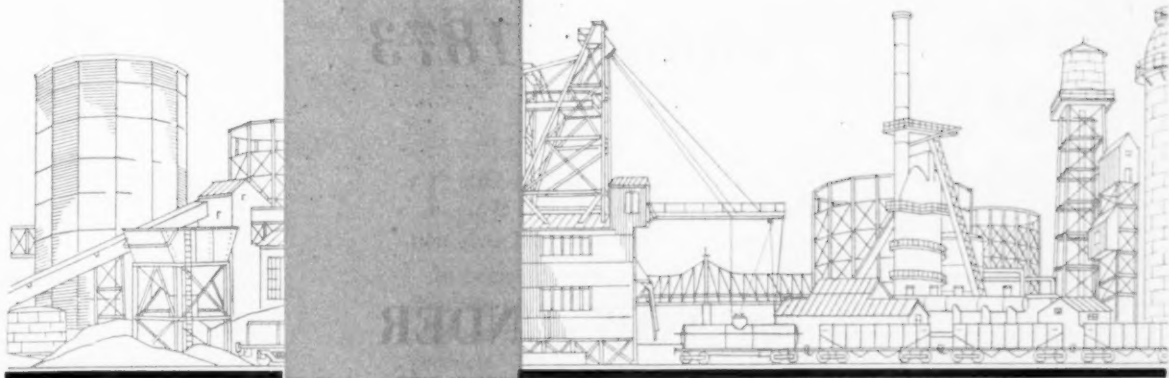
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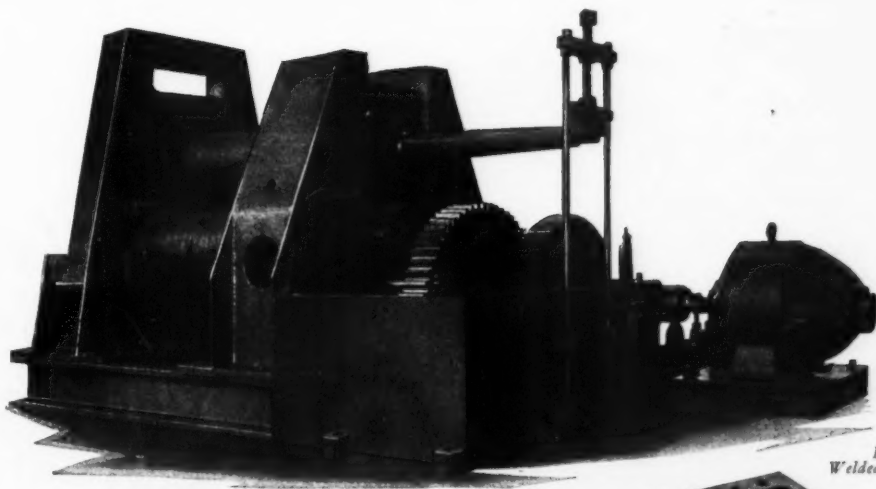
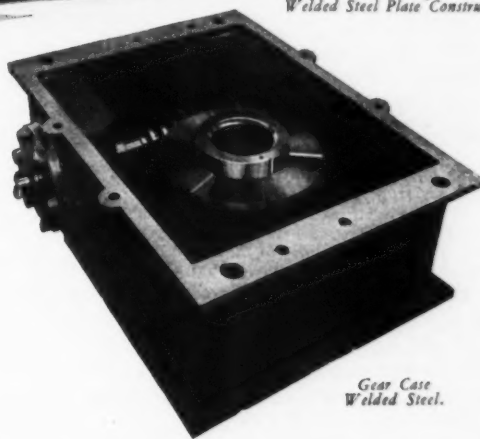


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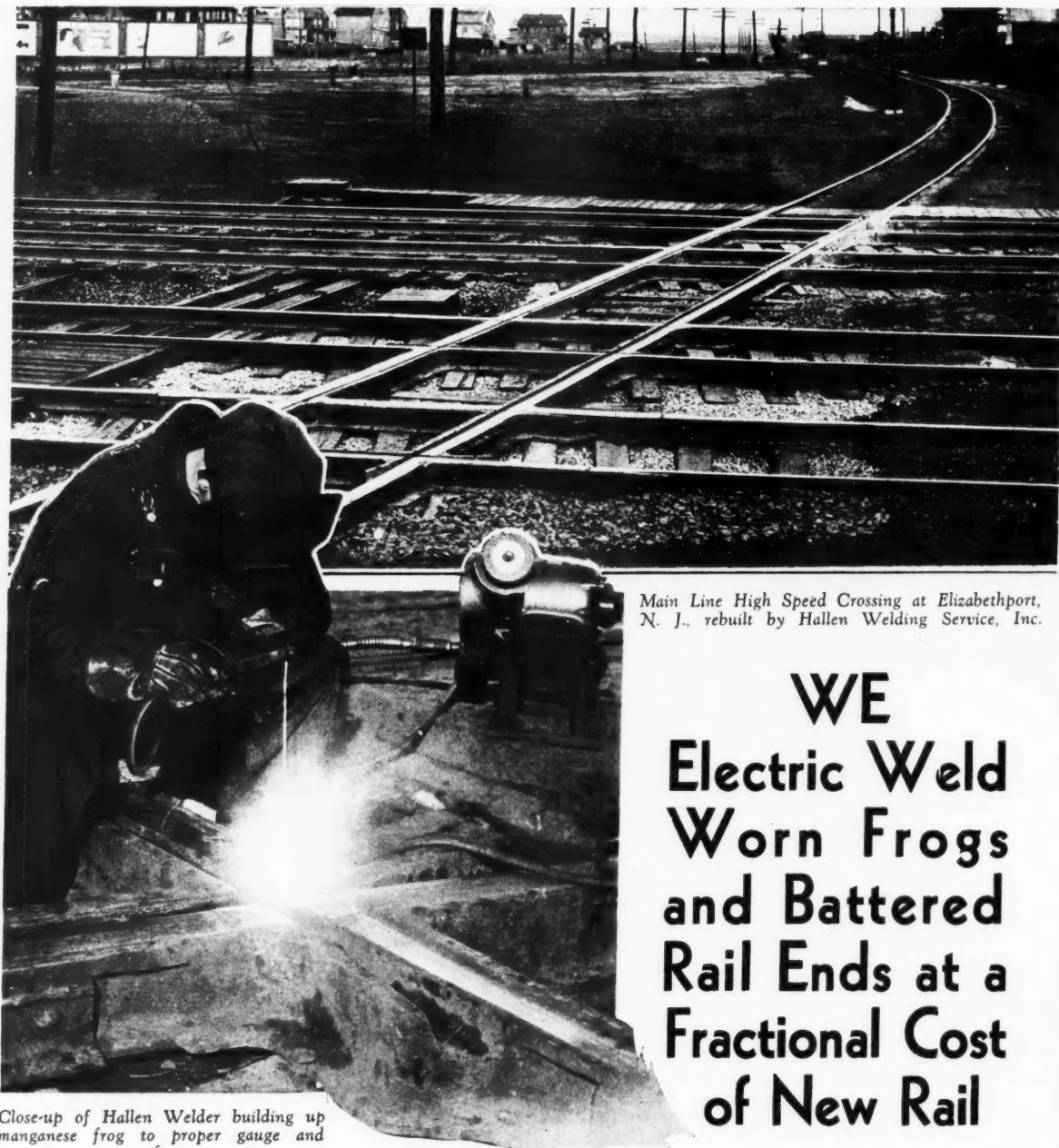
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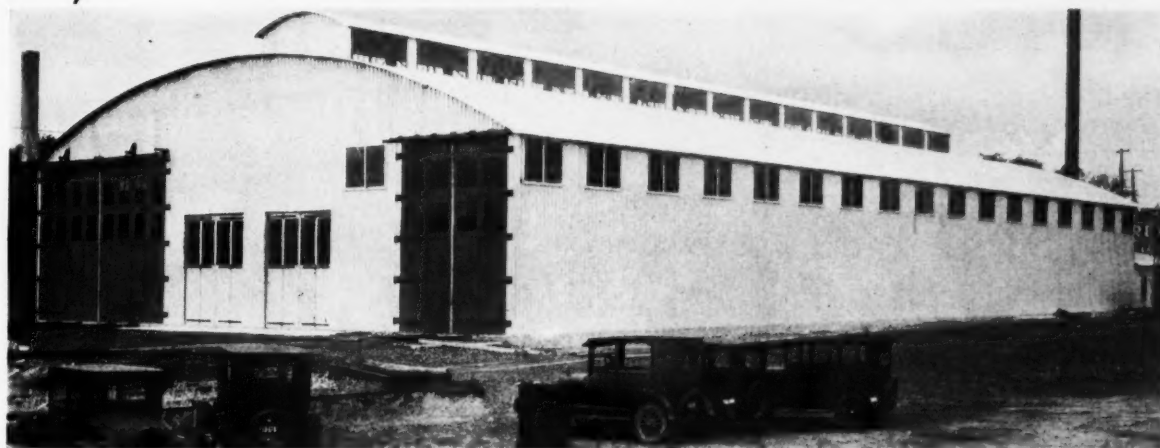
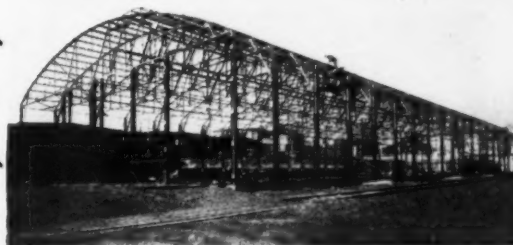
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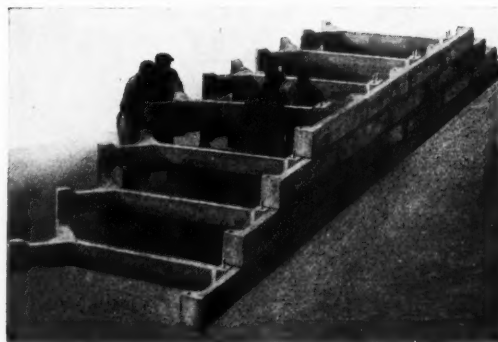


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No. 34 of a series

Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING COMPANY

105 WEST ADAMS ST.
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Subject: From Coast to Coast

September, 24, 1931

Dear Reader:

It was not until I paged through the first printed copy of our August issue as it came from the printer that I realized how extensively it exemplified the continent-wide service that we are trying to give you from month to month through Railway Engineering and Maintenance.

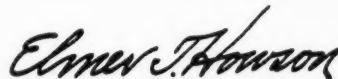
As you will recall, the first article in that issue described the practice which the Boston & Maine has devised to apply oil to the rails and fastenings over an extensive mileage of its lines in Northern New England. Immediately following that, you will remember that there was a description of the results secured by the Southern Pacific from 21 water treating plants in the far west. Both of these articles, incidentally, were prepared by one member of our staff from observations made on the ground, indicating the diversity of topics and the wide area of operations falling to the lot of a member of our editorial staff.

Following these articles there was one describing the use of ready-mixed concrete by the Burlington at Minneapolis and still another on the conservation of materials by a roadmaster in Texas. Likewise, the Central states were represented by a paper on the control of accidents, written by a railway officer at Pittsburgh; by a chart for checking train speeds that was developed on the Nashville, Chattanooga & St. Louis and by an article describing rail renewal procedure on the Chicago Great Western.

Equally well distributed were the contributions appearing in the Questions and Answers Department, replies coming from points as far east as Richmond, Va., and Savannah, Ga., and as far west as Seattle, Wash., and San Francisco, Cal.; in addition to answers from Buffalo, N. Y., Memphis, Tenn., Minot, N. D., Toledo, Ohio, St. Louis, Mo., Argentine, Kan., and other more central points.

Such a wide coverage of viewpoints and of problems, while entirely unintentional so far as this particular issue was concerned, is indicative of the completeness with which we attempt to cover developments in maintenance of way practices wherever they arise. By this means we feel that we are helping you, wherever you may be located, to profit from the experience of others, even though they may be far removed. In this way also we feel that maintenance practices, rather than becoming localized, may be brought up universally to the levels of the most efficient. Whether the idea originates in Portland, Me., or Portland, Ore., in Calgary, Alta., or New Orleans, La., it lies within the scope of our service to you.

Yours very truly,



Editor.

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Ballast distributed from center door only. Note where flow.



Ballast distributed from bottom door and side gates. Note streamers and clean rail.



Ballast distributed when needed. Note the clean rail.

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All illustrations from unretouched photographs.



Ballast distributed from side gates. Note streamers and clean edge of ties. Ballast not dumped.



Light distribution of ballast. Just enough ballast to clean the track.



Side door with hopper car ready to dump ballast. Photograph taken from side.

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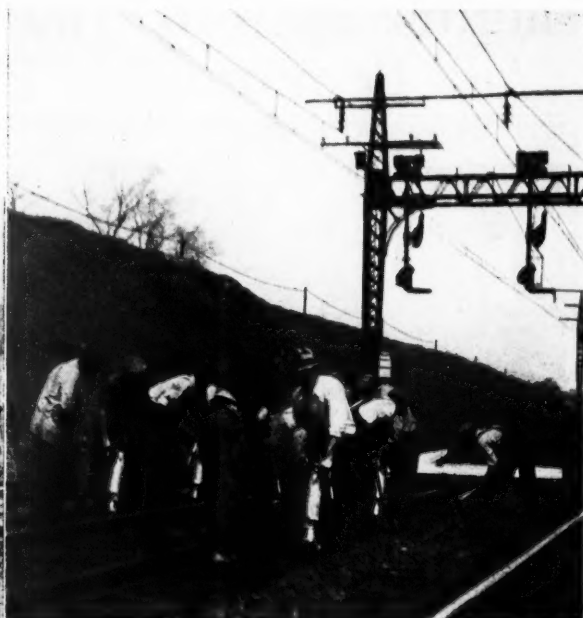
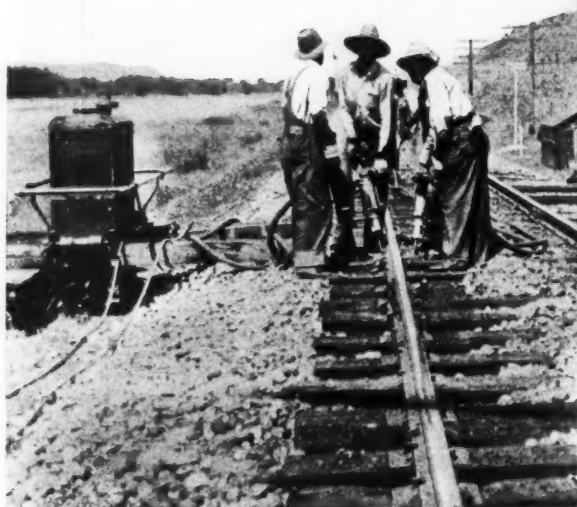
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Railway Engineering and Maintenance

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OCTOBER, 1931

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Railway Engineering and Maintenance



REVENUES

Need for Larger Income is Pressing

THERE is no one action that will more directly affect the large body of railway employees, and especially those in the construction and maintenance of way departments, than that which the Interstate Commerce Commission will take this month in answer to the application of the railways for an increase of 15 per cent in their freight rates. Every railway man knows that the roads are passing through a most critical period, for he has seen many of his fellows laid off and others working part time; he has observed needed work abandoned, current repairs postponed and, in all directions, retrenchment of the most drastic character. He knows also that the railways have turned to the commission for relief and have made their plight known to it. With so much at stake, he can do no less, in justice to himself, than to inform himself as to the facts in order that he may in turn acquaint those with whom he comes in contact with the true situation and thereby contribute to the proper appreciation by the public of the conditions in the transportation industry.

The Cause

The railways are, of course, suffering from the slackened business activity that is prevalent in all industries today. In the first seven months of this year, their operating income declined 29 per cent, as compared with the same period of 1929 (the last year before the break), while in the month of July (the latest for which figures are available) the decline was 39 per cent. Such a pronounced and extended decline is without precedent. As is to be expected, the net income declined even more precipitately, that for July, 1931, being 54.3 per cent less than for the same month two years ago.

To get the complete picture, however, one must go further back. The Transportation Act of 1920 set up for the railways, for the first time, an allowable rate of return on their investment, with provision for the recapture of earnings above that rate, and instructed the Interstate Commerce Commission to determine what a fair return should be and to so fix the rates which the roads would be allowed to charge as to permit them to earn this return. In compliance with this act, the Commission fixed the rate of 5.75 per cent as fair.

Eleven years have passed since this act became operative. In this period the trend of rates has been steadily downward, until the average revenue per ton mile is now more than 16 per cent below that of 10 years ago. As a result, the rate of return on the property investment of the railways has in no year reached the figure set up by the commission. Rather, in the years 1921-1930, inclusive, it averaged barely 4 per cent, while in 1930 it fell to 3.30 per cent and for the first seven months of this year, to 2.21 per cent, or only slightly more than half the rate of interest paid by savings banks. Measured in money, the net income of the railways from 1921 to 1930, inclusive, fell short of the return fixed by the Commission as fair by \$2,575,000,000.

Investing Public Turning Elsewhere

Under such conditions, it is not surprising that the investing public is losing faith in the railways as an avenue for profitable and safe investment. The extent to which this has taken place is shown by the fact that on September 19, 1931, the Dow Jones average price of leading railway stocks was the lowest recorded since April, 1897. That the public is not regarding the future of other industries with the same concern, is shown by a comparison of Dow Jones averages for railway and industrial stocks. Compared with the lowest quotation reached in the depression of 1921, the Dow Jones average for the leading railway stocks was, on September 19 last, about 19 per cent *lower*, while its average price of leading industrial stocks was 75 per cent *higher*.

Equally, or even more serious, is the danger that the present reductions in earnings may force the insurance companies, savings banks and other investment agencies whose placement of funds is limited by statute, to discontinue investing in the securities of many of the railways, a step which would close to the railways one of the largest sources of funds for refinancing and for improvement requirements.

Expenses Cut Heavily

To maintenance of way employees, this situation is of special interest because of the fact that the railway managements, in their endeavor to hold expenses in line with revenues, have made most drastic retrenchments. The magnitude of these retrenchments is shown by the expenditures for maintenance of way for the first seven months of the current year. In this period, the Class I roads spent only \$338,229,199, as compared with \$439,-

\$833,630 in the same period of 1930, and \$495,193,587 in 1929. In other words, the expenditures for the current upkeep of the tracks and structures have been reduced 23 per cent as compared with a year ago, and 32 per cent as compared with 1929. Another measure of the same trend is the fact that the number of employees in the maintenance of way department in July, 1931, was 35 per cent less than in the same month two years ago.

The same drastic slashing is taking place in capital expenditures. Following the passage of the Transportation Act, the railways undertook the most stupendous improvement program ever launched, and in the last 10 years have spent \$7,728,000,000 for additions and improvements to better their service. In 1929, they spent \$853,721,000 for this purpose, and although the business recession was pronounced in 1930, they actually increased their expenditures in that year to \$872,608,000. Facing a continued decline in business as they have progressed through the present year, they have been forced to abandon all but the most pressing activities, with the result that capital expenditures during the first four months of this year (the latest for which figures are available) totaled only \$93,656,000, as compared with \$273,772,000 during the same period in 1930, a decrease of 58.1 per cent.

Even with such drastic retrenchment, the roads have fallen so far short of bringing their expenditures in line with earnings, that reductions in dividends or their omission entirely are becoming matters of daily occurrence. Among the roads which have reduced their dividends in recent weeks are such outstanding properties as the New York Central, the Baltimore & Ohio, the New Haven, the Pennsylvania, the Lackawanna, the Central Railroad of New Jersey, the Illinois Central, the Nashville, Chattanooga & St. Louis, the Northern Pacific, the Great Northern and the North Western. Still other roads have omitted dividends entirely including the Boston & Maine, the Lehigh Valley, the Kansas City Southern, the Nickel Plate and the Rock Island. Surely such a record demonstrates the need for relief.

No Surplus in Good Times

Such opposition as has been advanced against the rate increase has been based primarily on the plea that the industries which will be called upon to pay the increase are themselves sorely depressed. This argument ignores the fact that when times are good, there is no limit to the amounts which they can charge for their services or to the surplus which they can accumulate to tide them over periods like the present, both of which privileges are denied to the railways. In other words, in the heyday of the boom period which preceded the present recession, industry at large earned liberal profits, while the railways, as a group, were restricted in the rates which they could charge to the point where they earned less than five per cent on their investment in the best year of this period, and such individual roads as were able to earn more than 5.75 per cent were subject to the recapture of half of their earnings above that figure. This is a fundamental difference in the conditions under which industry at large and the railways operate, which must not be lost sight of in times like these.

Those who opposed the granting of the increase also make much of the fear that the raising of the rates to the

levels proposed, will divert much traffic to other agencies, principally trucks, and thereby defeat its purpose. While this may be a result in some degree, its possibilities have been greatly magnified. To offset the proposed increase, as some contend, at least 13 per cent of the revenues derived under the new rates would have to be diverted. If it is assumed that the average rate per ton mile on the traffic that might be diverted from the railways would be twice the average derived from all traffic, it would be necessary for the trucks to secure seven per cent of the traffic now moving by rail. This would require 400,000 motor trucks in addition to those now operating. These trucks would require an added investment of \$1,200,000,000. Entirely aside from the question of raising such a vast sum of money, the effect of adding such a fleet of trucks on our already congested highways is self-evident. Such simple analysis proves the fallacy of this fear.

It is also argued by some that the granting of this increase will retard the recovery of business. On the contrary, it is pointed out by such a recognized economist as Dr. David Friday that the granting of the increase would stimulate business by improving the credit of the railways and bringing them back into the market for the materials and equipment which they so sorely need but which they are today unable to buy. Such buying will stimulate confidence in other channels of trade and create employment in many industries. It is in this respect especially that maintenance of way employees can appreciate the effect of the increase, for it goes without question that if it is granted, deferred expenditures will be authorized, forces will be increased, materials will be purchased from supply concerns that are themselves working only part time, and employment will be stimulated in many channels.

THE ROADMASTER

The Man and the Railway Officer

THE roadmaster has become an established institution on American railways. His position is unique. He is essentially a man of initiative. He must be a keen observer, arrive at decisions quickly, develop a high degree of resourcefulness and acquire the knack of conducting his office work at odd times and with a minimum of interference with the daily tour over his subdivision. But over all he must have a faculty for getting things done when they should be done and with whatever means are at his command at the time. The demands on his time, the hardships he endures, the limited opportunities afforded him to enjoy the companionship of his family, must find their compensation in a sincere love for his work. It must have a fascination for him like a game that he plays from day to day, in each of which he finds some new problem that tests his ability and resourcefulness.

Railway Engineering and Maintenance has always treated track maintenance and its kindred problems objectively. It has dealt solely with the physical facts as they are and what is being done or can be done to deal with them intelligently and effectively. But because main-

tenance of way has its intensely human side, as exemplified in the roadmaster, it was decided, in the absence of the Roadmasters' convention which has been featured in our October issue for the past 15 years, that this issue would be devoted in considerable part to the roadmaster as a railway officer and as a man. Some of the material presented on following pages is distinctly laudatory, depicting the roadmaster as others see him, other contributions offer constructive criticism not only of the roadmaster himself but of railway management in its relation to him, while four contributors point to the part which the roadmaster must play in the present railway crisis.

THEN AND NOW

Early Days Had Many Shortcomings

EVERY indication points to the fact that the organization of the Roadmasters' Association of America marked the beginning of the trend toward modern maintenance practices. The contrast between the conditions of that day and of the present are so great that the younger men in the maintenance field have little conception of the difficulties that beset their predecessors, even in the prosecution of their routine work. Let us consider only a few of them.

Roadbed both in cuts and on fills was narrow, averaging from 14 to 16 ft. and often did not exceed 12 ft. Tiling was almost if not entirely unknown; yet drainage had to be maintained. The necessity for restoring the shoulder on fills was frequent. Today, when a roadmaster has work of this character to do, he has at his command ditching machines of many types, caterpillar-mounted shovels, draglines, spreader-ditchers, automatic dump cars, etc. Then, hand labor, with wheelbarrows, a grampus or a work train and flat cars to transport the material, was his only recourse, unless, as rarely happened, he could secure a team outfit with drag scrapers.

Rail was light and joint fastenings inadequate, the fish plate being the most common joint device. Bolts were generally of iron and could not be kept tight, while the rail quickly became depressed, with a permanent surface kink at the joint. Spring washers in great variety had been introduced during the preceding five or six years, but none of them had proved satisfactory, so that the old plain or iron-clad fibre washer was still in common use.

As late as 1888, few roadmasters had heard of tie plates, which were then just coming into use. Anticreepers were unknown and many were the expedients for arresting the creeping of rails, which gave unlimited trouble. When rail became tight, the light sections offered little resistance to buckling, which was, therefore, one of the many troubles with which trackmen had to contend. Power machines for handling and laying rail and performing other operations in this connection had not been thought of, so that a high ratio of man power was necessary for rail renewal.

Many roadmasters of today do not know what a raising bar is, yet as late as 1890 a list of tool equipment for section gangs, presented in a committee report to the

Roadmasters' Association, included this implement. It was also mentioned in a work on track maintenance, published in 1903, as a tool that should be provided for section work. Compare this crude tool, which usually took three men to operate, with a modern track jack or even the more powerful devices now used for some classes of work.

Hans Christian Anderson once wrote of a man who was convinced that he was living in a degenerate age and who longed so earnestly for the days of yore when conditions were better, that through magic, he was transported back to the period for which he so yearned. He immediately discovered that he had made a serious tactical error. Some of us may be inclined to wish for the days when locomotives and cars were light, when a day's work was never done until the job was completed, and when wear-resisting rail and hardwood ties could be obtained. We should remember, however, the man in the fairy story, who found too late what he had never realized, that though present conditions may not be ideal, the world has been advancing steadily.

WINTER WORK

We will feature this subject in November

THE time has come to lay plans for the winter, but this year it is necessary to approach the subject of winter work from a different angle. Heretofore, it has been discussed from the standpoint of its influence on a more uniform distribution of the labor allotment throughout the year. In other words, it was then a question of what work could be done in the winter with the same degree of efficiency as in the summer. But now, owing to the curtailed maintenance programs of the past two seasons, so much work has been left undone that it is now a question of the amount of constructive work that can be continued throughout the winter because it still remains to be done.

Believing that *Railway Engineering and Maintenance* can render its readers a real service by discussing this problem, it has been decided to devote our November issue to the subject of winter work as it must be faced this year. Of primary importance, of course, is an answer to the question—What Work Can Be Done?—as it concerns the track, bridges, buildings and water supply facilities, but of no less consequence are the tasks that must be faced every winter, for no matter whether the season proves to be a mild one or a severe one, the maintenance organization must be ready. Tracks must be kept clear for the movement of trains, heating plants must be effective for extreme low temperatures and water supply facilities must be kept from freezing.

This implies the necessary organization of the forces for emergency work and the installation of facilities designed to increase the effectiveness of the men in meeting these conditions. But with all this, is the need for careful planning that will insure the greatest productive output on the many items of maintenance work that had to be deferred during the summer by reason of limited appropriations. It is from this angle that we will approach the various phases of this general subject in our November issue.

What Executives Think of the Roadmaster



Loree, Baldwin, Aishton, Storey, Besler and others give expression to the place of this individual in the railway organization

IS the roadmaster a person of any importance in the railway set-up? Does he command the respect of his executive officers? Are his duties merely routine or are they of basic importance? In other words, is the roadmaster essential to his railway?

If the answers to these questions were left to the public at large, it would be found that it knows little about him and probably cares less. In so far as the average layman has any interest, the railway personnel embraces locomotive "engineers," trainmen, station agents, section foremen and that indefinite class commonly designated by newspapers as "high officials," who are supposed to spend most of their time enjoying the seclusion and luxury of "private" cars. To the railway officer, however, the roadmaster looms far more prominently, for to this man, in the words of W. B. Storey, president of the Atchison, Topeka & Santa Fe, the executives "pay tribute." In an address before the Roadmasters' Association in 1925, he said:

"The public knows little of you. It thinks of the engineman driving the huge locomotive through the night, but it knows nothing of the roadmaster who has made the track safe for that engine. It thinks of the train dispatcher weighted with the responsibility of keeping trains from running into each other, but it does not know of the roadmaster who must keep the track clear of slides. The public does not know of the roadmaster who, in washout, in snow blockade, in disaster of any kind, is always on hand day or night doing his part to restore train service. I wish, therefore, to pay my tribute to the roadmaster and to tell him how valuable a part of the organization I consider him."

Attitude of the Executives

This statement is typical of the attitude of railway executives, for while the roadmaster and his work mean little to the public, as pointed out by Mr. Storey, he stands high in the esteem of the railway managements. L. C. Fritch, vice-president of the Chicago, Rock Island & Pacific, has expressed this view most emphatically.

"My first railway employment," he said, "was under a roadmaster, a man whom to know was to honor and respect for his many excellent qualities of honesty, ability and unflinching integrity, and since that time and through all the years of my railway service, this

man, a typical roadmaster, has stood out as an example and a character worthy of emulation. It is, therefore, only expressing my innermost sentiments and feeling, borne of experience, that the roadmasters on our American railways represent a class of men and employees second to none in responsibility of position, sacredness to trust, honesty of purpose, fidelity to duty and good citizenship. Any praise which I can give them is only half sufficient and doubly merited. Your responsibilities have grown with the progress made in railway construction and operation and your abilities have enabled you to cope successfully with these responsibilities."

In the same vein, although stated in fewer words are the statements of H. R. Safford, executive vice-president of the Missouri Pacific Lines and Col. F. G. Jonah, chief engineer of the St. Louis-San Francisco.

"We all know," said Mr. Safford, "that a track man is an enthusiastic worker. There is no department of a railroad, in my opinion, where there is more loyalty or enthusiasm than among track men." According to Col. Jonah, "There is no class of railway men that I would rather greet and meet than roadmasters, for in my long years of experience in construction and maintenance, I have had to work with them closely, and have come to know and appreciate them for their sterling qualities of reliability and dependability."

Intelligence

It remained for L. F. Loree, president of the Delaware & Hudson, and chairman of the Kansas City Southern, to define those attributes of character that are essential for success as a roadmaster and the possession of which have made it possible for the men in this position to earn the praise of their superior officers.

"It is not because you men have education," he explained, "but because you have intelligence that you occupy administrative positions of authority, and it is to the extent that you exercise this intelligence in the conduct of the affairs entrusted to you that we count with hope on overcoming the difficulties with which we are beset. What we look to find in you is a great fund of common sense, a power of knowing or hitting the mark as to things and ideas, the impression of the cautious, critical, shrewd and well-balanced, acting as a sort of curb and correction of the errors that education and history so often produce.

"Your two great assets are self-knowledge and self-reliance, and these you should assiduously cultivate. You are engaged in a great and noble occupation, and are citizens of the greatest and finest of countries, which

offer to you and to your children the most unbounded opportunities. But you carry responsibilities as heavy as these blessings are large. The realization of the one is dependent upon your attitude toward the other."

Railway executives have always been given to direct dealings with the roadmasters with a view to getting prompt action on some objective of prime importance. This is prompted by the conviction that once the idea is driven home to them they will find the shortest way of producing the desired results. No one has been more pleased to avail himself of the opportunity to do this in his talks before the Roadmasters' Association than R. H. Aishton, president of the American Railway Association, who has long been a friend of the supervisory officer. Thus, the opportunities that are afforded the roadmaster to effect substantial savings in the conduct of maintenance work were uppermost in his mind in 1926, when he pointed out that the part the roadmasters play in increasing the efficiency and economy of railroad operation "lies in the development of methods, in the development of means, in the development of practices and in the development of the conduct of their work." He also said:

"It seems to me that your organization might well look for opportunities to save money in the conduct of your work. A large part of the saving is going to come from the development among you of better methods of performing the labor on the railroad, whether by compressed air, electricity, or any power other than man power. The more efficiently you do your work the more it will be reflected in the total cost by which the railroads are enabled to operate, and the better the opportunity you will give them to compete with these other forces that are being brought up to take their business away from them."

Public Relations

Increasing responsibilities have been imposed on the roadmaster with the growing intricacies of railway transportation, and with a realization of the importance of favorable relations between the railways and the public. The place of the roadmaster in the promotion of a better understanding of railway problems on the part of the public was emphasized by L. W. Baldwin, president of the Missouri Pacific, and once a roadmaster himself, when he spoke to the roadmasters as follows:

"You men have in your hands an opportunity for service of a big, broad, constructive kind, part of which is incidental to and a necessary part of your daily work and part of which might be considered entirely aside from your routine duties. I am referring to the opportunity which all of you have to help in thousands of incidental ways to make your respective railroads better properties, and to instill in your associates and the employees whose work you supervise a spirit of greater loyalty to their properties, based on a better understanding of the fundamental things in the transportation industry. But you have an even greater opportunity, as I see it, to inform yourselves and in turn to inform your friends and the public generally about the railroad business so that the public may understand better and appreciate more easily the questions with which we are confronted.

"This means, naturally, that each of you must study a great many things besides the business of maintaining track, laying rail and similar matters. It means that you must familiarize yourself with the problems of the management. You must learn more about the cost of producing transportation and the many and various things that enter into that cost. It means that you should

familiarize yourself, not only with the cost of those things which you handle and which enter into the production of railroad service, such as ballast and steel, ties and labor, but also with the cost of fuel and other supplies, equipment and facilities generally."

Still Romance in Railroading

As a source of popular appeal, railroading has been eclipsed by aviation. There was a time when all boys wanted to run locomotives as today they aspire to become fliers. But even in the days when the railway was the basis for heroics in prose and poetry, it was the locating engineer or the locomotive engineman who occupied the romantic role. Be this as it may, there is still romance in the work of the roadmaster, notwithstanding the fact that he occupies "the difficult and often unpleasant position of performing hard and dirty work when the occasion demands." This comment taken from an address by W. G. Bessler in 1924, then president of the Central Railroad of New Jersey and now chairman of the board of directors and of the executive committee of that property, served as the preface for the following, which surely demonstrates that there is much that should appeal to the imagination of the boys of this day.

"Who goes out, more often by night, in a bleak, wintry wind with its drifting snow, and cleans the switches and keeps the track open?"

"Who hastens to the scene with track and bridge men, or an extra gang, to meet and deal with a fire and burn-out?"

"Who is called out of bed and told by telephone or the call-boy that there is a washout and that traffic is at a standstill, and who goes by motor car or work train to the scene to repair the damage?"

"Who is among the first to be notified that there has been a bad accident and that all tracks are blocked, and to get to the scene with all possible speed?"

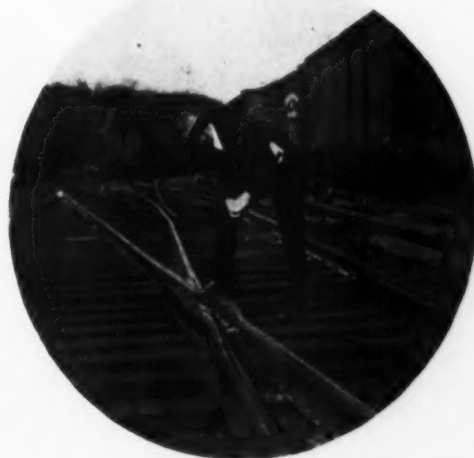
"Who gets hell for a low joint in an otherwise perfect stretch of miles of track?"

"Who goes to the office on Sunday mornings to see if everything is well?"

"Who is called upon and generally makes proportionately the largest contribution when the order goes out to reduce expenses?"

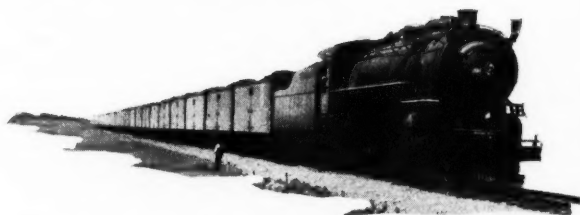
"Who makes possible a speed in safety of 75 miles an hour for an express train?"

"The roadmaster!"



Meeting the Crisis

Ways in which roadmasters may aid their managements in maintaining adequate service more economically



The Success of Our Railroads Depends Largely on the Amount of Business They Handle

THE railways are passing through a most critical period. Their traffic has declined steadily for two years. Drastic retrenchment has been the order—yet net earnings have declined to the point where many roads are falling far short of their fixed charges.

Maintenance of way expenditures constitute nearly 20 per cent of the total expenses of the railways. Nearly 85 per cent of maintenance of way costs go for the upkeep of the roadway and other facilities under the charge of the roadmaster. It is to him, therefore, that the railways look for aid in so conducting his operations as to maintain safety of travel, while at the same time holding his expenses to the minimum during the present period of stress. In the discussions which follow, four men, each with many years experience as a roadmaster, direct attention to ways in which this officer can share with his management the burden of offsetting the present reduction in business with more economical administration.

He Must Think and Act

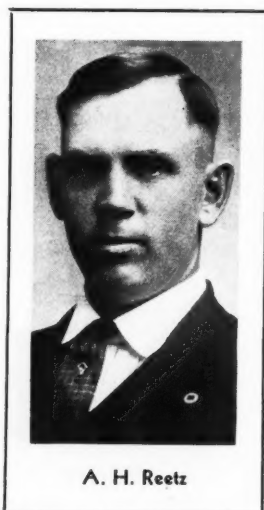
By A. H. REETZ

Roadmaster, Minneapolis & St. Louis, Hampton, Iowa

TIMES have changed. No one knows this better than the roadmaster, especially the "old timer." Years ago we had an abundance of material, plenty of help, short sections and shorter divisions. Today, owing to the widespread business depression, unfair truck and bus competition, etc., we find a vastly different condition to work under.

Somebody has said that "any roadmaster who knows track can make a first class railroad if he has lots of men and material, but it takes a good man to do a lot with a little." How true this is of present-day conditions. The watch word today is save,—and then save some more.

The savings that a roadmaster can make are of vital importance to his management. He is responsible for the safe maintenance of his track, the price of which is eternal vigilance. The roadmaster who, in this crisis, is going to pity himself because his sections and territory have been lengthened, because he does not get the ma-



A. H. Reetz

terial and men he thinks he ought to have, is not the true and loyal employee that the managements of the railroads have always regarded as typifying the roadmaster. Obviously he is not a roadmaster in the true sense of the word.

A roadmaster must necessarily adjust himself to present conditions. He must see that his track men feel the necessity for the same adjustment, wholeheartedly getting the maximum amount of work done each day and being alert to the necessity of the conservation of all supplies and materials, and not comprising a disgruntled lot of men indifferent to the co-operation that the managements must have from all employees.

It should be the aim of roadmasters constantly to look for and devise new ways of doing work, new ways of saving material and saving money in many other ways, to patch a fence and save a stock claim, to go thoroughly into safety measures, eliminating careless workmen before and not after they have an avoidable injury.

Needs Unlimited Patience

The position of roadmaster today requires a man of unlimited patience. Proper organization and discipline will bring results. A great deal can be accomplished by the attitude of the roadmaster toward his men. A policy of fair dealing on his part produces a similar spirit in the whole department. Discipline must be tempered with good judgment. Discipline is not loud talk: in fact some of the quietest of men exact and obtain the strictest obedience.

The unemployment situation favors us as it enables us to secure first class men and get the maximum amount of work done, because each man knows that there are many others waiting to take his place. More and better work can be accomplished than some years ago when we were compelled to employ inferior men to some extent; if this is not being attained now, it is due to lack of proper organization.

Considering that the roadmaster has done his utmost to perfect his organization, the task devolves into proper instruction. The constant thought of the roadmaster should be the conservation of man-hours and of materials and supplies, not however losing sight of the safe maintenance of his track.

Avoid Surplus Material

Before any material is ordered, he should find out if he cannot supply the need from new or usable material on hand on his district. Perhaps the needed material can be supplied by repairing—if a frog is needed, possibly he has a badly-worn frog that has been scrapped, because it was too far gone for the welding operator to repair but which a shop can restore to usable condition

with new rivets and bolts and rebuilding the worn parts. No frog should be scrapped. Even a frog involved in a derailment and badly twisted can be reconditioned in a shop where frogs can be taken apart, and some good frogs built out of a bunch of otherwise scrap frogs.

In large yards some tracks carry heavy traffic while on others the traffic is comparatively light. In many instances frogs and switch points can be shifted around, a good frog or switch point being taken from some turnout where the traffic is light and reinstalled at some point where the traffic is heavier, thereby saving the purchase of new material.

With reference to crossing frogs, it is necessary to keep on hand an emergency frog on account of the time that it requires to get a new one from the manufacturer. Many of these frogs are of manganese construction and quite expensive. Instead of tying up a lot of money in an emergency frog it is desirable that this frog be a rebuilt frog or a frog of light and cheap construction but good enough to carry traffic for a limited time.

Track ties cost a lot of money. A tie that will last another year should not be taken out. If it can be made to last another year, you have saved the expenditure of anywhere from \$1.50 to \$2. Many ties carried over in that way, of course, mean many dollars saved.

Tie Renewals Should Be Supervised

A tie should not be removed simply because it is rough looking or adzed. In many instances a weak tie can be safely left in track if the adjacent ties are good. The personal inspection by the roadmaster of all ties to be renewed is important. I have found it to be a very good plan not to install the full allotment of ties in the spring, but to carry their renewal along from the spring until late in the fall. In other words, I make a monthly tie renewal program and allot each section a limited number of ties sufficient for the immediate needs. Furthermore, on any railroad where strict economy is practiced in tie renewals, it is impossible to determine conclusively in the spring just what the requirements are going to be by fall, for broken tie ends are bound to show up and ties that look pretty good in the spring will get punky by fall. A monthly tie renewal program will take care of this. A section foreman who knows that he will get only a limited number of ties each month is going to be careful to place them in the track where they will do the most good.

Should Inspect Ties To Be Removed

The roadmaster should inspect all ties before they are removed from track; he should also inspect the old ties after their removal. This will enable him to educate his foreman to the careful and proper renewal of ties. An old or weak tie that could safely be left in track for another year, if located in the quarter or center of a rail, would not do at all under a joint. The support of the rail joint must be considered to save the rail, to eliminate low joints.

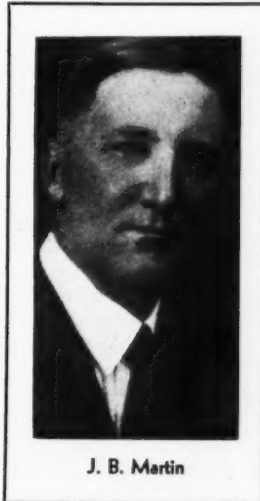
Considerable savings can be effected in motor car operation on sections by timely repairs to the motors and by watching the gasoline consumption. Section crews run into town for dinner. The ride refreshes them somewhat and they get a warm dinner but they are spending the company's money unnecessarily. A train may delay them in getting away from the tool house after dinner and they then stand around. Even if they are working only a mile or so from their headquarters, they should carry their lunch.

There are many ways in which a roadmaster can aid his management at this time if he will "think and act."

Every Detail Demands Scrutiny

By J. B. MARTIN

General Inspector of Track, New York Central Lines West of Buffalo, Cleveland, Ohio



J. B. Martin

SINCE the very beginning of railroads, the roadmaster has been an important factor in their maintenance and operation. He has seen their development from the crude construction with light materials of the early days to the present massive roadbeds and tracks carrying wheel loads at speeds that were little dreamed of a decade or so ago. Furthermore, he has had no small part in this tremendous and rapid development.

The roadmaster is responsible for all of the property between the right of way lines, except such structures as bridges, build-

ings, signals, etc., that are maintained by other departments, although even the construction and maintenance of these often involves the track structure so that his interest and responsibilities extend in some degree to all of the fixed property. The care and maintenance of this property constitute a large responsibility. In addition, there is probably no other officer who is called upon to handle a greater variety of special jobs and tasks than the roadmaster. He is the emergency man and it is to his credit and an evidence of his resourcefulness that he acquires himself so creditably in every emergency and at every call.

A Man of Large Responsibilities

The roadmaster has a large assignment and is a man of parts. He is responsible for the expenditure of a large sum of money each year for both material and labor and its economical and efficient application is dependent in large measure on him. Whether it is wisely and efficiently expended or whether there is wastefulness depends on his careful planning and watchfulness.

Roadmasters are economical by nature and training, and in these days of declining traffic and earnings there is a greater call than ever for the exercise of these qualities. He owes it to his management to exert and apply himself along this line as never before in order that the maintenance dollar will be stretched to its farthest limit.

Much has already been accomplished along this line, but there are still opportunities for further savings. In order to effect these, it will be necessary for the roadmaster to study his organization and its every activity. There can be no taking for granted that there are no better or more economical ways of doing certain things or that certain things must be done and cannot be eliminated or changed. Every activity must be studied and examined with microscopic care with a view to eliminating ones that are unnecessary and improving others.

The best means of insuring economy and good work are careful planning and programming. There should be a general program covering several seasons and there should be a complete and detailed program for each season, with as little interference with it as possible. Every

part of the organization should be familiar with this program and inspired with the idea of carrying it to completion in an economical manner. Attention to details will show where many economies can be effected. For example, in the distribution of material, how much time is lost by section and extra gangs waiting for material or having to do extra and unnecessary handling on the ground. On rail laying jobs, if all of the material is distributed with one trip of the work train and so placed that there will be no unnecessary handling and so that every item will be in its place when the rail is laid, it will be surprising how the cost will be reduced. The careful distribution of ballast will not only save large rehandling costs but will also save ballast. Certain track patrols may be combined or eliminated without detriment. The same careful attention to the details of other activities will show similar opportunities for savings.

Watch Waste

Savings in material will be made by seeing that it is properly applied, by watching the scrap pile and seeing that all usable material is salvaged and that material in track is not damaged by neglect. For example, how many joints are battered because of loose bolts, improperly fitting compromise bars, muddy joints or switch points damaged by worn stock rails, all of which might have been avoided by a stitch in time. Quality work is always the most economical.

Much will depend on the roadmaster's organization for which he is responsible. It means the careful selection of foremen, their training and guidance. He must encourage his forces and be ready at all times to give attention to their problems, receive and consider their suggestions just as he has a right to expect the same consideration from his superiors. There should be no tendency to stay in a rut, but on the other hand everyone should be in a receptive mood for new and better ideas.

New ideas in equipment and devices are being brought out constantly. These should have careful study and consideration to determine whether they will prove efficient and economical. They are sometimes condemned without proper trial. On the other hand sometimes their purchase is a needless expense as their use is too limited to justify the investment. Roadmasters' recommendations will go far to correct this and they can be of great value in finding auxiliary uses for equipment, extending its use and cutting down the idle time and at the same time producing economies.

Close co-operation with other departments will produce splendid results. This is particularly true where several departments are involved on the same job, where there should be thorough analysis and co-operation in planning the work so that there will be no needless expense. The railroad pays the bill regardless of who does the work. Close co-operation with the operating department will often show opportunity for mutual helpfulness. This is particularly true in handling material and the use of tracks for definite periods.

The roadmaster can be a great aid to his management in the study of materials and standards. By close observation, he can determine their merits and weaknesses and be able to discuss them intelligently with his superior officers and point out where improvements can be made and economies effected. It is with this as it is with his methods, or equipment. He should take nothing for granted but make everything prove itself.

Last but not least, in fact the greatest service he can render his railroad today is in his capacity as an ambassador to its neighbors and patrons. He has a wide

acquaintance and many contacts and is in a position to cultivate and establish many friendly relationships. It is in his power to take care of and smooth out many matters which, if neglected, may lead to serious and long standing misunderstandings. A few of the many matters with which he is directly concerned are crossings, fences, drainage matters, driveways, platforms, stock yards and industrial sidings, all of which may be the cause of criticism. He should be in touch with all matters that concern his department, affecting neighbors and patrons and be prepared to recommend the proper course to follow to avoid friction and misunderstanding.

The Broader Responsibilities

By B. E. HALEY

General Roadmaster, Atlantic Coast Line, Lakeland, Fla.



B. E. Haley

NO industry in this country has changed more in the past few years than the railroad industry. We, as railroad people, are facing conditions that were undreamed of twenty-five years ago. Every employee of the railroads knows that the problems that are now confronting our managements are the most serious that they have ever been called on to solve. The situation is critical, and the very existence of our railroads depends on whether these adverse conditions can be combatted successfully during the next few years.

The question of the duties of a roadmaster, and the part that he can take best to assist his management, is a broad one, and one that is well worth the serious consideration of every man holding that position. In the old days, nothing was expected of a roadmaster beyond the maintenance of his track successfully at a reasonable cost. As a usual practice, he took little interest in other departments except to the extent that he thought they were interfering with his maintenance.

Can Secure Traffic

The lack of intelligent and full co-operation between departments, and between the employees as a whole, has been too long neglected on most roads. Failure of the employees to recognize this fact has caused the loss of a lot of business that could have been retained by the roads. The fact is now plain to every one that more money cannot be continually taken out of a concern than is put into it. The success of our roads depends on the amount of business they handle. First of all, every employee should be a soliciting agent. I know of no class of men that exert a larger influence in this connection than our roadmasters, if they will do it. Probably a great many are doing this. Some may still not realize what they can accomplish along this line.

A roadmaster should acquaint himself with, and cultivate the friendship of, every patron of the road on his district. He should also acquaint himself with those in charge of business concerns in his territory who are not patrons, with the view to securing additional business.

He should impress upon his foremen and all other employees under his supervision, the necessity of securing every pound of freight and every passenger that can be gotten for his road.

No man is without influence, and most of our foremen are influential citizens in the communities in which they reside. Every roadmaster on my division is an active member of, and in some cases president of, one of the Better Business clubs that have been organized by the employees over our entire system. The foremen and most of the other employees of the roadway department are also members. The purpose of these clubs is to furnish traffic tips, create a more friendly feeling between the public and the railroads, and to further the interest of the company in every way possible. Acting as a group we have, in many cases, been able to recover a lot of business from trucks operating in our territory. It is understood in a quiet way that we do our buying from concerns that ship by rail and are friendly to the railroads. This is very effective in railroad centers, where the railroad payroll furnishes most of the ready cash. In one instance, we are getting four or five cars of automobiles by rail each month, that formerly came in by trucks. It was only necessary to bring to the dealers' attention the fact that most of his cars were bought by railroad men. These instances could be multiplied many times. A list of concerns that are friendly to the roads, and use them, is available to each employee.

Every roadmaster should explain thoroughly to all of his men the matter of the unfair competition which the roads are subjected to by the operation of buses and trucks on the highways, at a nominal cost and without regulation. The men should be informed as to the Government's activities in connection with inland waterways and subsidizing water transportation. The roadmaster should explain to his men the advantage of keeping these things before the public, and discussing them at every opportunity. There is a growing sentiment among the public against this unfair competition and if the matter is continually agitated, it will eventually get results.

Watch Every Expense

In the matter of maintenance, the roadmaster should be more alert and diligent than ever before. He should watch every expenditure in the most careful manner, and see that no expense is incurred at this time that can possibly be avoided. No orders for material or tools should be passed until he satisfies himself personally that the material is actually needed. A careful check should be made of all tool houses and supply yards and a list of surplus supplies made. In many cases it will be found that a proper distribution of supplies on hand will avoid the necessity of ordering more. Renewals of every kind should be closely watched. Often ties, switch ties, frogs and switches are removed when still fit for further service, because the material is at hand and authorized for replacements. Close supervision of this class of work is sure to result in large savings in actual dollars and cents.

Extra train service should not be called for, except in cases of absolute necessity. Careful planning and the use of facilities available will often prevent the need of extra train service. Heavy-duty motor cars, trucks and trailers, will handle some of the work more economically than a work train. When train service is used, the presence of the roadmaster on the job usually results in the work being finished more quickly and economically.

A big saving can be accomplished by a personal and frequent inspection of motor cars and other roadway machinery. Unfortunately, not all foremen and men in

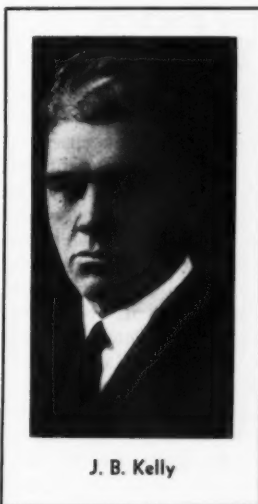
charge of this class of equipment are as interested in its upkeep as they should be. Proper care will keep the equipment out of the shops, and keep down the cost for new parts.

The responsibility of the roadmaster during this crisis is heavy. Much depends on him and his organization. Will he prove equal to the emergency? My long and wide acquaintance with these men leads me to believe that they can and will "come through" and acquit themselves creditably, both to themselves and to their management, individually and as a whole, as they have always done heretofore.

Make Sure That Economies Are Real

By J. B. KELLY

General Roadmaster, St. Paul & Sault Ste. Marie, Minneapolis, Minn.



J. B. Kelly

IT IS a matter of record that the roadmaster has responded to every emergency in a way that has won for him the esteem of his management. Not only has he done this in local periods of stress, but also in the greater crises such as the one through which the railways are now passing, wherein the efficient control of expenditures for track labor and materials will contribute so greatly to a successful outcome in these uncertain times. He will not fail now but will be found at the head of the procession, co-operating with his management to the limit of his capacity in

reaching the goal which the management has set.

The character of the individual roadmaster is usually reflected in the condition of his territory and if it is found to be such that it does not fit well into the order of affairs today, it will be wise for him to take such steps as will eliminate objectionable features. Some years ago, it was said that results were to be secured from foremen by continually finding fault with their work, regardless of the results of their accomplishments. Such a method will cost real money now. No roadmaster can satisfy himself that he has rendered adequate service to his railway until he has analyzed the performance of each of his foremen in every particular and works hand in hand with each man with the purpose of impressing him with the necessity of making every move count. An inferior foreman or workman will no longer have an opportunity to "just get along," but will either drop out of service on his own accord or by suggestion or will apply himself actively to his task.

One of the practices which should be eliminated under present conditions is that of sending a foreman, sometimes with a limited knowledge of the work to be done, onto another section for the home foreman immediately and very naturally loses his initiative and interest. Rather, in these trying days, it is better for a roadmaster to instruct each of his men in the work to be done on his own territory and then place the responsibility on him and give him a chance.

(Continued on page 905)

1882-1931

A Half Century of Achievement

For 50 years the Roadmasters' Association has had a potent influence in developing the maintenance of way practices of the railways of America

AS THE semi-centennial of the Roadmasters' and Maintenance of Way Association of America, which will occur in 1932, approaches, it becomes both profitable and instructive to pause and review the beginnings and the accomplishments of this, the oldest organization of maintenance of way officers in America, which will, therefore, be the first to be able to celebrate its semi-centennial. When it was formed in 1882, thus antedating the American Railway Bridge and Building Association by 8 years and the American Railway Engineering Association by 18 years, maintenance methods were in a chaotic state. In every section of the country, on different railways and even on different divisions of the same road, these practices had grown out of local conditions and the individual experience of the officers who were responsible for maintenance.

Small as was the start, this society, which today holds so important a position among railway associations, came into existence as a result of the pressing need for some means whereby maintenance men could get together and exchange ideas on the fundamentals of their work and, so far as practicable, correlate their practices. Specifically, the foundations of the association were laid by Charles Latimer, one of the outstanding maintenance engineers of his time.

While Mr. Latimer was chief engineer of the Atlantic & Great Western and of its successor, the New York, Pennsylvania & Ohio (now a part of the Erie), he organized the 12 roadmasters on these roads into an association, which held meetings annually. They were brought together to discuss maintenance methods and difficulties and to consider the correlating of these practices for the road as a whole. The proceedings of these meetings were printed and apparently they were rather widely distributed on other roads. Although Mr. Latimer never became a member of the Roadmasters' Association, he evidently took an active part in forming the organization and he definitely guided and advised its officers during its early years until his death on March 25, 1888.

There was little precedent for the guidance of the officers of the newly-formed association in the conduct of its affairs. Through the wisdom of its founders, however, the practice was adopted of assigning subjects to committees for study and report, with recommendations as to the best or most desirable practices. These

reports were presented and discussed on the floor of the convention and adopted or rejected by a majority vote of those present.

Opinions Differed Widely

In these early days, owing to the wide diversity of practices, there were often as many ideas on a subject as there were roadmasters in attendance. As a result, the discussions were animated and long. Disagreements occurred in committees so that majority and minority reports were not unknown. More than one report was returned to the committee that made it, for further study and agreement. In considering the question of the proper weight of rail, at the convention held in Cleveland, Ohio, in 1887, the following comment on the fate of the report of the Committee on Rail, was made by the secretary at the opening of the second day's session.

Early in the discussion yesterday, the subject ran off of the track at a bad joint and in the wreck of ideas that occurred, little was said that really bore on the report of the committee. Many divergent opinions were expressed prior to this event, however, which indicated a desire on the part of many members for a heavier rail to suit their heavier traffic, while others are content with their lighter rail. Cannot we come together on common ground and express in a convincing way a united opinion, based on facts and experience, that will aid railway managers in their consideration of the proper weight of rail to provide?

The following substitute for the report under discussion was then offered and adopted unanimously:

It is our experience that with first-class steel rail on our main trunk lines, where the interchange of traffic necessitates the passage of a heavy tonnage and heavy locomotives at rapid rates of speed on well-balanced and well-tied roads, nothing less than a 60-lb. rail is sufficient for the maintenance of a first-class track. On unballasted roads, the weight of rail should be increased about 15 per cent to make up for the absence of ballast. On roads of less tonnage, a rail of less weight should be adopted to suit each special case, as determined by competent engineers and roadmasters.

There was plainly evident a feeling of uneasiness on the part of many of the roadmasters who took part in the discussion of this report. Not a few of them had seen freight cars increase in capacity from 10 or 15 tons to 30 tons, while locomotives had already reached the "unprecedented weight" of 60 tons. They recognized that the track structure was not keeping pace with these developments and they were unable to foresee what the end would be. One speaker of wider vision predicted the eventual development of rail weighing 100-lb. to the yard, an event which came to pass only five years later.

Indicating that some of the problems of the roadmaster were not radically different 50 years ago from those he has to meet today, the subjects of drainage, crossties, rail joints, fastenings, nut locks and foot guards were discussed at length at the first convention, which was held at St. Paul, Minn., on September 15,



16 and 17, 1883, but no definite action was taken, except on drainage, the report on which was adopted. Owing to the infancy of the organization, only one committee was prepared to report at this first meeting, this being the Committee on Drainage, and its report was brief, reading as follows:

"For stone and gravel ballast, the ditch should be at least seven feet and not to exceed twelve feet, from the rail, and at least two feet below the bottom of the tie; the slope to commence three inches above the bottom of the tie and not to exceed two inches per foot. For mud track, the slope to commence from the bottom of the ties.

One of the most aggravating difficulties with which trackmen had to contend in those early days was unevenly gaged and worn wheels, the effect of which was extremely severe on rails as well as frogs and switches. After considering how the detrimental effects of poor inspection and maintenance of wheels could best be minimized, the second convention, which was held at Indianapolis, Ind., in September, 1884, adopted a resolution recommending the use of a rail section not lighter than 65-lb. nor heavier than 70-lb. While the railways did not embark on their Safety First campaign until many years later, the roadmasters of this day were giving the matter serious consideration, one of the subjects at this convention being Life Saving Appliances. The discussion, however, centered largely around foot guards at frogs and switches. No committee reports were submitted and no definite action was taken except on the resolution. The other subjects before the convention were Surfacing, Elevation of Curves and Gage of Tracks.

Joint Fastenings Were Poor

At the third convention, which was held in Chicago on October 14, 15 and 16, 1885, a full complement, five in number, of committee reports were presented and this practice has continued without interruption to the present. Two of the knotty problems of the day were the proper design of frogs and guard rails, and the size and form of rail joints. These subjects held a place on every program for several years after their initial consideration at this convention.

Whenever the question of rail joints was brought up, there was a sharp division of opinion as to whether they should be of the supported or the suspended type. The advocates of each stoutly maintained their opinions so that there were much argument and many sharp passages on the floor. This matter continued to be on the program every year until 1897, when it was passed on to the American Society of Civil Engineers, which was thought to be better equipped to make an investigation of the whole subject of rail and joints, with a request that it work out a practicable and satisfactory joint fastening.

As an example of the early efforts toward standardization, and some of the difficulties of the procedure that was necessary to bring this about, the convention at Chicago adopted certain standards for frogs and guard rails. These were submitted to the Association of North American Railroad Superintendents for approval. That association made some changes and additions and returned them with drawings to the Roadmasters' Association for further consideration. After an agreement they were again referred to the Superintendents' Association for further approval, after which they were sent to the General Managers' Association for final approval, which would make them standard for the country. The record is silent, however, as to whether this final approval was given.

In view of the wide diversity in the character and form of the track tools used on different roads, the question

of standardizing this equipment was given attention early in the history of the association. No definite action was taken, however, prior to 1895, when a committee that had had the matter under study for two years, made definite recommendations, which with a few amendments, were adopted. It is of particular interest that some of these standards for tools have remained unchanged, except in a few minor details, until today.

Although numerous forms of track levels were in use, the committee presented a design of its own having a graduated end, so that the superelevation on curves could be given with precision, a result which none of the existing levels was capable of giving. Exactly similar levels are in service today, while the fundamental principles of this design are now applied to all levels. Likewise, the committee selected a design of spot board and surfacing blocks, which had been developed by a section foreman whose name is not given, that are substantially the same as those in use at present, this device being approved but not adopted as a standard because it was patented. The track chisel, sledge, spike puller, lining bar and track wrench, which were adopted at this time, do not differ in any essential particular from those now in common use on the railways. The recommendation that the track gage be a straight wooden gage was not received favorably and this item was returned to the committee for further study.

Among other chaotic situations that existed was the practice of widening the gage on curves. Many roads were widening the gage on curves as low as 1 deg., and after a thorough study of the subject, the association recommended, in 1898, as standard practice that the gage on curves of less than 8 deg. should not be widened, except where a certain class of locomotives were in service, in which case the limit should be 6 deg.

Other examples in great number could be cited, if space permitted, to show the constructive work done by the association in its effort to create standards of practice. While this feature has never been lost sight of, it is found in later years, as this objective has been more nearly approached, that more attention has been given to the economics of maintenance and the development of more efficient methods of doing work.

Scarcity of Timber Causes Anxiety

Diminishing timber supplies were a source of grave anxiety to roadmasters 50 years ago. Many of them feared that the growing scarcity of timber, which was then beginning to be felt in certain sections, would force the acceptance of large numbers of inferior and under-size ties. Discussion raged over the proper thickness, width and length of crossties. Should they be 6 in. or 7 in. deep? Several members were on their feet at once. Should they have an 8-in., a 9-in. or a 10-in. face? More insisted on being heard. "We have no timber from which such large ties can be cut." "We can get all of the ties we want with a 12-in. face and are using large numbers of them." "The rail cuts through a 6-in. tie so rapidly that they are not safe." "A 7-in. tie rots out before it cuts out." "Engines are getting so heavy that we must have bigger ties." These were only a few of the pungent remarks that seasoned the discussion. Finally a standard of 7 in. by 8 in. by 8 ft. was adopted for ballasted track and of 7 in. by 10 in. by 9 ft. for unballasted track.

Preservative treatment of wood was first mentioned at the sixth annual convention, which was held in Washington, D. C., in 1888. Robert Black of the Manhattan Elevated told of the experience of that road with both "vulcanized" and creosoted ties and reported excellent results with the latter. During his talk, he mentioned a

device, known as a tie plate, that was apparently new to many of those present. When he said that his company had installed 16,000 of these plates, $\frac{1}{4}$ in. by 6 in. by 8 in. during the two preceding years and had ordered 20,000 more, one member jumped to his feet and asked, "Doesn't this make a rattlebox of your railroad?"

Switches and Switch Stands

While there were still many stub switches in both main tracks and sidings, a large number of which were continued in service for years after the birth of this society, the split switch had been introduced for a sufficient time for most of the early members to be familiar with it. As a consequence, although stub switches were often mentioned, the most of the discussion centered around the design of the switch stand. Automatic switch stands, which would permit the switch to be run through without damage, had many advocates. These were divided, however, between those who favored a spring in the connecting rod to bring the point back to position and those who thought that the device should be so designed that the points would not be damaged but would remain open. According to their view, the target and switch lamp would also be revolved to indicate the open position of the switch. Stoutly opposing these views were others who insisted on a rigid connection between the stand and the point. They were somewhat at a loss, however, to say how they would protect trains which might be approaching a switch that had been damaged in this manner. Still others, some of whom apparently did not take either side of this strongly debated question, wanted detector bars at switches to prevent them from being thrown under moving cars, which is another evidence of the old proverb that there is nothing new under the sun.

Economics of Railway Labor

Economics of railway labor came in for early consideration, a report on Labor on Track having been presented at the sixth annual convention, in 1888, and considered at this and the following meeting. This report contains what was probably the first attempt to classify track in accordance with the character of the traffic it was required to serve, the classes as proposed being as follows:

1. Roads having heavy tonnage and fast trains.
2. Roads having moderate tonnage and fast trains.
3. Roads with light tonnage.

An attempt was made to determine how the work should be divided between section and extra gangs, and to allocate section forces and the number of men per mile for the different conditions of traffic and character of ballast, stating that this allocation, which was considered on the basis of a uniform force throughout the year, should be distributed according to the seasons and as climatic or other conditions might require.

Railway Supply Manufacturers

One of the interesting features of the early proceedings is the advertising. The proceedings of the fifth annual convention, held in 1887, contained only three advertisements, The Variety Iron Works of Cleveland, Ohio; the Cleveland Frog & Crossing Works, also of Cleveland; and the Wier Frog Company of Cincinnati, Ohio, all manufacturers of switches, frogs and crossings. The following year, however, there were 27 manufacturers who advertised their products, including such well-known firms of the present as the National Lock Washer Company; Fairbanks, Morse & Co.; the Kalamazoo Railroad Velocipede & Car Co.; the Buda Foundry & Mfg. Co.; the Ramapo Iron Works and the Ajax Forge Co., now the Ramapo-Ajax Corporation; and the Elliot Frog & Switch Co.

The devices advertised, in addition to switches, frogs and crossings, included tie plates, nut locks, grip nuts, pumps, rotary snow plows, hand cars, velocipede cars, push cars, track jacks, bridge jacks, culvert pipe, track drills and other track tools, an automatic torpedo signal and electrically-operated automatic block signal devices.

During the first few years, there was apparently no organized exhibit of railway supplies, although the presence of supply men at some of the conventions is mentioned. The first organized exhibit seems to have been in 1888 and was placed directly across the hall from the convention room, there being 28 exhibitors. Profiting by their adverse experiences in securing hotel accommodations and the cost of the space for the exhibits, the manufacturers met at the convention, which was held in Minneapolis in 1891, and organized the Roadway and Track Supply Association of America with 37 charter members.

This review has referred only to the earliest years of the association, partly because few of the members of today have knowledge of the formative years of the society and partly to show the constructive work of those early years. Much of the valuable work, which is being done today by the association, would be impossible were it not for the solid foundation which was provided by its founders, the impetus which they gave to its work and the steady guiding hand with which they steered its course.

At the time when the first convention was held, there were no standards as such. Every roadmaster and every chief engineer was a law unto himself and they followed their own ideas as to devices and methods. A change in the administration of the engineering department of a road often resulted in a complete change in the maintenance practices and sometimes in a nearly complete change in the personnel.

Only a few of the subjects which were given consideration have been mentioned. Some of the questions they discussed are still matters of controversy. Others, many of them, were settled and settled so intelligently that today the practices they standardized are so much a matter of routine that many of us would wonder that they were ever in controversy. Probably there was no matter upon which opinion was more sharply divided than that of square or broken joints. Today it is seldom mentioned because experience has shown that the standard adopted by the association was the proper one.

This review might be carried to much greater length, but enough has been given to show that from the first, the efforts of the association have been directed along constructive lines and that from the start, it has had a record of accomplishment. With all the credit that is due to other organizations which have been and are now working in the maintenance field, much of the advance in this field would never have been made had it not been for the faithful, persistent and intelligent efforts of the early members of the Roadmasters' Association of America, which was the name under which the society was organized. Those of us who, today, are carrying on where they left off can do no better than to follow the example which they have given us. The proceedings of no organization can show, on the part of its members, more singleness of purpose, greater interest in the work they are doing, a keener desire to improve their practices or a finer spirit of co-operation than is shown by the great body of roadmasters who did and who now constitute the membership of this, the oldest association in the railway maintenance field.

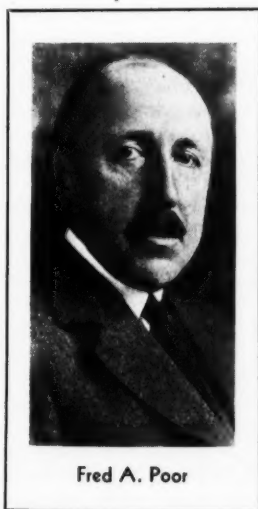


As the Supply Man Sees Him

The roadmaster from the viewpoint of manufacturers of appliances employed in railway tracks and track maintenance

By FRED A. POOR

President, Poor & Company, Chicago



Fred A. Poor

WH O has not thought, as he stood by the track and watched the engineman lean out of the cab window as his train flashed by at 60 or 70 miles per hour, that "There is a man who has to take a lot for granted." In other words, his duties compel him to place his life in the hands of men who are responsible for the safety of the track. Obviously, no man is appointed to the position of track foreman who has not evinced the elements of character that make him fully capable of realizing this grave responsibility, and no foreman is promoted

for the improvement of his track, and because he has had ample opportunity to learn the value of money he is just as anxious to conduct his routine maintenance operations and betterment work so that every dollar will be spent in a way that will result in the best possible condition of the property for which he is responsible and in which he takes such a vital interest.

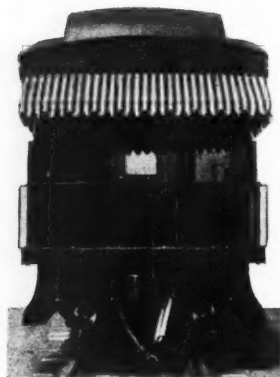
Want to Interest the Roadmaster

It is not surprising, therefore, that the supply man welcomes the opportunity to interest the roadmaster in the products which it is his business to sell, whether this opportunity comes to him at the roadmaster's office, out on the line, or at an exhibit of track appliances. True, the roadmaster is only human and like other men is susceptible in some measure to the influences of intimate personal relations. However, because of the intensely practical nature of his work and a keen realization of his responsibilities, he is not easily swayed by sales personalities or outside pressure. The sincerity of his attitude with respect to the promotion of new appliances is readily apparent to anyone who has observed his reactions when he is engaged in the study of supply exhibits. Obviously anxious to learn, his enthusiasm is tempered with a skepticism that is not overcome until he is satisfied that the appliance is capable of meeting the requirements of actual day-to-day conditions. That his interest is not transient has been demonstrated to those who have overheard conversations of one roadmaster with another, during which this device or that was discussed in detail. In brief, the roadmaster is interested in new appliances and materials because of his desire to effect improvements

(Continued on page 893)

to roadmaster until he has shown that his concern for the safety of track has become a dominating factor in his mental makeup. This conclusion is not the result of conjecture but represents the outstanding impression that comes to anyone who has occasion to establish business relationships or has had the good fortune to earn the friendship of the men who occupy this important position in the railway organization.

This is one reason why the roadmaster stands high in the esteem of the men engaged in the sale of track materials and appliances. With safety of train operation constantly uppermost in his mind, the roadmaster is ever on the alert to initiate and promote projects



If I Were General Manager

How often we have longed for the authority to correct a condition which retarded our work and increased its cost. In this article a roadmaster sets forth his views on railway management as it affects track maintenance and points to certain common practices which interfere with results

If, after more than 40 years' service as a section laborer, a foreman and a roadmaster on a heavy-traffic, high-speed railroad, I were to be made a general manager, bringing with me to the higher position the knowledge gained from my experience in track maintenance and construction work, I believe that through that experience I could do something to help the roadmasters on our railroad and, by so doing, earn profits for my company as well. It has been truly said that no other subordinate officer in our railway organization has as good an opportunity to observe operating conditions and practices as a roadmaster while engaged in his regular duties of carrying on the maintenance work for which he is directly responsible. A roadmaster should therefore be in a position to make valuable recommendations in connection with operating as well as maintenance matters, and if I were general manager I would encourage my operating officers to give their roadmasters greater recognition as members of their division staffs than they now enjoy.

No doubt some of the roadmasters who may read the title of this article will assume at once that a roadmaster who became general manager would be liberal in authorizing the new and heavier rail, additional and more expensive ballast, the modern work equipment and the many other essentials of good track that they have desired for so many years. But I, and no doubt most other roadmasters if they were made general managers, would manifest just as much concern for the interests of our company as we do in our subordinate positions. In considering increased budgets for track maintenance I would give very careful thought to the economic value of such improvements, taking into account the desired standards of maintenance, and of course in the final analysis I would, like all other general managers, be governed by the ability of my company to finance the improvements.

Organization

Believing that organization is a fundamental to success in any business, I would, if a general manager, encourage my roadmasters, foremen and others in the maintenance department to add to their knowledge of their work by the reading of current literature and by participating in meetings of various groups. It has been demonstrated that where foremen meet in groups with roadmasters and other officers, the better methods of doing the work soon become standard practice and the morale of the men is raised.

Going further, I would, as general manager, encourage meetings of my roadmasters with other maintenance officers and look with favor on their active participation in the voluntary associations that have proved of value as clearing houses for advanced ideas and methods for track maintenance, and which have in the past paid ample returns to individual members and to the railroads participating for the time and money expended in such activities.

Because kind words are of much value as an antidote for the effects of hard work and long hours of service, I would show by example and insist in my instructions, that my subordinates be courteous at all times, even in the face of the many emergencies and perplexing problems with which railroad men must contend. In a good organization there is no room for the sarcastic letter writer, often a minor clerk who, because he may have the privilege of signing his superior officer's name, acquires a magnified opinion of his own importance and wrongfully uses his typewriter to convey stinging criticism which often discourages men who are devoting themselves loyally to the interests of their employers.

In any organization that is to be successful, care should be taken to see that chief clerks or others do not assume or are not given duties which they are not qualified to perform. If I were general manager, I would see to it that the recommendations of my roadmasters as to allowances of labor or material would be passed on by competent officers whose experience and knowledge of conditions on the line would qualify them to assume such important responsibilities, and that no clerks would be delegated to do things that they are not fitted for.

Knowing that well-considered programs for maintenance have in them elements of savings in various ways, I would require that when extensive rail laying or ballasting work is authorized, the division staff hold meetings to discuss and decide on the time most suitable for such operations, taking into consideration seasonal variations in traffic and always bearing in mind that traffic interference adds greatly to the cost of such work. I would instruct my operating officers that in multiple-track districts, arrangements be made to do all general rail relaying and heavy ballasting without interference from traffic—that is, by diverting trains to tracks other than the ones on which work is being done by track gangs.

When doing such work in single-track districts, I would insist that in-so-far as consistent with the requirements of high-class service, dead freight and other

trains of minor importance be scheduled to pass through the working limits of track gangs before or after assigned working hours, thus avoiding loss of time to the gangs.

Knowing, as most maintenance men do, how rapidly labor costs mount when it becomes necessary to make general renewals in busy train yards, and especially when renewing ladder tracks, I would instruct my local operating officers to co-operate fully with the roadmaster and make such arrangements as will permit track renewals or changes to be made with the minimum interference, which plan will permit the use of cranes for handling heavy material more rapidly and safely. As a roadmaster, I know that there will be strenuous opposition in some instances to such an arrangement, and that the old familiar "Can't Be Done" cry would again be heard as it was when roadmasters first proposed the diversion of main-line, high-speed traffic when working in multiple-track districts. But knowing that with full co-operation most tracks and even busy ladders can be spared during certain hours, I would as general manager help the roadmaster and our railroad by having it done.

The value of modern work equipment in the economical and highly efficient track maintenance now being performed has been proved, and as a general manager I would request my roadmasters to keep themselves informed as to developments in that field, making recommendations to the proper officer. And when machines of demonstrated value were asked for, I would make consistent efforts to have them purchased, and provide capable labor to operate and maintain them. Tools of proper design and good quality are most economical for use in maintenance work, as elsewhere, and because of the roadmaster's opportunity to determine what tools are best suited for his work, I would help him to secure such tools by getting the co-operation of our purchasing and stores departments.

Frequent changes and improvements in various track appliances justify constant study to determine which are best suited for use under varying conditions, and while not taking away from our engineering officers any of their prerogatives in the matter of design and specifications (for which they are best fitted) I would consider the recommendation of my roadmasters as to the continued use of such appliances after they have tested them and observed their performance in service.

The Roadmaster and Clerical Work

Believing that a roadmaster should be free to a great extent from the details of office work, I would endeavor to eliminate all unnecessary correspondence and reports. But believing that the roadmaster should keep himself informed as to the cost of all work in his charge, I would authorize the use of such clerical forces in his office as might be necessary to obtain essential cost data, handle necessary correspondence, make up requisitions after they were checked by the roadmaster, and handle such other office detail as the practice on our railroad requires. As general manager, I would have no patience with any of my subordinates who would put into effect orders curtailing clerical help in the roadmaster's office, to the extent that would tend to burden him excessively, for this will keep a valuable officer tied to an office chair trying to perform the duties of a clerk, whereas a roadmaster is first and always a supervising officer who can and does earn larger dividends for his company when he is out on the line.

As general manager, I would help my roadmasters by eliminating at the source much needless correspondence

resulting from the current tendency to circularize everybody on the railroad upon the slightest provocation; I would like to help the roadmaster and many others by checking the flood of circulars and bulletins that are sent out by the thousands but read by few. I believe I could help a lot of people by laying off some typewriters and the typists who operate them, at the same time reducing the large annual stationery bill, and give roadmasters and others more time to devote to productive work.

Co-operation of Purchasing and Stores Department

As general manager, I would endeavor to convince our purchasing department that it is more economical to purchase good materials at higher prices than to show temporary book savings by buying inferior articles at a lower first cost, but which can readily be shown to be far more expensive in the end. Knowing that good men, good material and good supervision are three essentials to good track, I would help my roadmaster to secure them.

Roadmasters should be, and usually are, best informed as to the needs of their districts or divisions in the way of material and tools; therefore, to help the roadmaster I would insist that the store department co-operate fully by furnishing materials promptly. However, I would not be of much help to the roadmaster who would permit accumulations of idle materials, or who would not carefully scrutinize requisitions before approving them or who failed to train his subordinates properly in the use and care of material. The greatest success in handling material, in avoiding accumulations of idle material, in the application of the proper salvaging methods, and in obtaining general efficiency in conserving the money of the railway company represented by material, comes from co-operation on the part of all concerned with the matter, and I would help my roadmasters by insisting on such co-operation.

Others who can but sometimes do not help the roadmaster are those employees at stations, in yards and on trains who appear to be afflicted with a complex that causes them to delay as much as possible the movement of company material. Some station agents and their forces, yardmasters and their forces, as well as train crews, seem to think that any time next year will be all right to deliver a car of company material or a small local shipment. If I were general manager, knowing what I do about some of these delayers of company materials, I would help the roadmaster by impressing on my subordinates that without a track we would not have a railroad, that without material we cannot maintain a track, and that a yardmaster, a station force or a train crew that fails to co-operate by performing an important duty is unfit to remain in service. I would also impress upon my subordinates my belief that an organization that fails to handle company material with reasonable expedition will without doubt also fail to give service to our patrons. I have seen trains starting out of a terminal with light tonnage although one or more cars of company material had been left behind, because the yardmaster or his assistants failed to co-operate.

As general manager I would try, and I believe I would succeed, in impressing on some who do not now appear to understand, that no enginehouse, no terminal yard, no depot, no locomotive, no single or small group of facilities or no group of employees who man any one of them can by itself function as a railroad, but that it takes a combination of tracks, locomotives, cars, depots, shop facilities, and more than all else, loyal co-operating service on the part of the men and women who handle the physical units to produce efficient transportation.

If I Were a Roadmaster

Some reflections on his opportunities and his shortcomings,
by a man who has been one

[In these days when so much is demanded of a railway officer, he is in danger of becoming so engrossed in the tasks immediately before him that he fails to look to the larger possibilities beyond. The author of this article was himself a successful roadmaster for years and is now in a position where he can observe the methods of many other roadmasters. His observations as to the essentials of the successful roadmaster of today are set forth in this article.—*Editor.*]

If I were a roadmaster, I would recognize that the roadmaster is rapidly becoming a more important officer in the management of the railroads than ever before, and I would endeavor to measure up to the responsibilities and to the opportunities of the position today. I know that in the past roadmasters have often been listed among the spenders on the railroad and have not been given to the study of real economies. In this respect they have not been altogether to blame, for some general officers have been quick to criticize any slight irregularities in maintenance work, such as an occasional decayed or broken tie, a few spikes standing a little too high in the ties, or a slightly ragged roadbed, at the season of the year when weeds grow rapidly and other work is urgent. In such cases, the roadmaster commonly argues that if he were given adequate forces, he would eliminate such complaints, even though this might result in the removal of track ties before their life is really expended.

Watch Tie Renewals

If I were a roadmaster, I would keep constantly before me the fact that probably no other single item on the road can cause so wasteful an expenditure of money as the improper supervision of tie renewals. It is difficult for an oldtime track man to realize that he should now be renewing no more than 150 ties per mile of main track, whereas in the olden days more nearly double this number was common. I am aware of the fact that during the earlier days of track maintenance it was considered good practice to renew ties very heavily when surfacing was being done, in order to prevent the tearing up of the roadbed in the following seasons. This was



This Track Illustrates the Author's Ideas on Dressing Ballast to Minimize Blowing Dust

especially necessary in dirt ballast, but I find that it is still being practiced on many first class main lines, often with the consent of the management.

If one considers the present average life of the treated tie, he can easily see where such a practice is not only wasteful but absolutely unnecessary. With an average of 150 tie renewals per mile, there will be no more than an average of one tie per rail length of track to be renewed at a time. In ordinary clean ballast this cannot possibly do any damage to the surface of such track, the only requisite being that each mile of railroad must receive its quota of ties yearly rather than at irregular periods, as is so often the case even now.

If I were a roadmaster, I should most certainly endeavor to spread my tie renewals over my entire subdivision and not permit the bunching of ties anywhere, except, of course, in road crossings and at such inaccessible points as railroad platforms. The practice of absolute single tie renewals is well worth considering and is being worked out to splendid advantage on some trunk lines on this continent. Certainly, we all must realize that one rotten

tie by itself is of no very great concern so far as the safety of the track is concerned, while if ties are renewed in small groups, as is so often the case, they must necessarily be removed much sooner than the individual tie.

If I were a roadmaster, I would face the fact that the development of machinery for maintenance work has made it necessary for the modern roadmaster to acquaint himself with a wide variety of useful devices, many of which are now indispensable for the average rail renewal or ballasting gang. Quite naturally there is a tendency in some quarters to go too far in the use of such machinery and it is for this purpose that the roadmaster of today should endeavor to single out those types of machines that will save him the most money and discard others that may as yet be rather expensive luxuries.

Keep Dust to a Minimum

The comfort of the passengers on railroad trains is being given more consideration now than ever before, even to the extent of artificially cooling dining and sleeping cars. Such innovations will probably extend to the day coaches if the railroads are to hold their pas-

senger traffic as they so much desire. As an aid in this effort, I would contribute what I could to comfort in travel by seeing that fine ballast is not spread out on the tops of ties where fast-moving trains will pick it up and carry it into the coaches, to the great discomfort of the passengers; nor would I allow fine ballast to be stirred up by permitting the weeds to be cut in dry weather.

Following this a bit further, I know that if many roadmasters would give more attention to the ballast section of their roadbed when trimming new ballast to templet and allow the track ties to project above the ballast a considerable amount, a great deal of this dust nuisance would be arrested. This breaks up practically all of the sweep under the trains and eliminates the clouds of dust which arise where the ballast is filled flush with the tops of the ties, or even above them as is still the case in many places. If it should become necessary to change the standard of the roadbed section, I would dress up a few sections of track in this manner in order to afford a comparison with the standard ballast section that I found to be too dusty.

If I were a roadmaster, I would study the prevailing trend towards extending a roadmaster's territory even further than in the past and allowing him a larger supervisory staff—say a general foreman or general track inspectors. At the same time sections are being made longer and the foreman's duties are naturally becoming more important than before. This naturally calls for high grade foremen who can handle larger forces. With the present improvement in track motor cars, such a plan is entirely feasible and it is being adopted by several roads.

If I were a roadmaster, I would give this tendency careful consideration, as I believe that, if properly developed, it will result in better conditions, not only for the roadmaster but for all others concerned. It should also make the roadmaster's position of considerably more importance to the management.

Take Copious Notes

I have, in the past, noted that the roadmasters who are considered the better men on a district are those who make written notes of their observations when riding over their subdivisions on trains, rather than depending on their memory concerning matters that they intend to talk to their foreman about later. We often hear discussions as to whether track can be inspected better from the front or rear end of passenger trains. Many good roadmasters contend that they can do better work from the rear of the train than from the engine, and I agree with them. Also, I have not favored asking section foremen to ride over their sections on engines for there is too much difference in the riding conditions of engines to allow one to judge track properly from that position. I have observed that some of the best section foremen I have known never rode an engine but were close students of the riding conditions of their track as they observed it when close to the track itself.

Most roadmasters realize the importance of following up the relaying of new rail to see that it is carefully maintained immediately after it is put in track. Nevertheless, we often see rail that has been considerably damaged by reason of improper maintenance following this work. This is especially noticeable where the follow-up work is done entirely by section forces rather than by an extra gang passing over the new rail to put the track in line and surface immediately following the job of relaying. This is one of the jobs that I, if a roadmaster, would feel obliged to follow up personally to insure that I secured the longest life possible out of the rail.

We often hear stories, even in the present day, of trouble caused by sun kinks. This is one item that is too important to leave to a section foreman, and if I were a roadmaster, I would give it my personal attention. In fact, in most cases the roadmaster himself should be held responsible for any neglect on his subdivision, for sun kinks do not develop in a few hours but rather result from the "bunching" of steel for several months before trouble actually occurs.

If I were a roadmaster, I would check this up very carefully early in the spring and arrange for the relief of rail at the proper places many weeks in advance, for serious trouble is sure to follow if this is neglected. Where there is an extreme range in temperature, as in most of the northern states and Canada, it is practically impossible to expect the same rail to remain in the track winter and summer without serious trouble from sun kinks, unless considerable attention is given to its protection by the roadmaster in charge, by replacing long rails with shorter ones at various intervals over his subdivision. This is a rather expensive procedure but is much cheaper than the serious consequences that may follow a sun kink. If such a practice is followed, much better gage and line can be maintained.

If I were a roadmaster, I would see to it that every mile of my subdivision was in the best possible riding condition, rather than allowing my track to become irregular by reason of better maintenance in one location than another. In this way I would escape much criticism from my superior officers, for it is frequently found that one or two miles on a single section will give rise to enough criticism to reflect on the entire subdivision. Too often we find that trackmen are inclined to want to show how much improvement they can make in a given piece of track as it is being overhauled by a surfacing gang, rather than maintaining it all in a fair condition.

Two Types of Roadmasters

I have observed that there are two types of roadmasters on most of the railroads. They can be distinguished easily by any experienced track man who rides over their divisions. One is the roadmaster who depends almost entirely upon each individual section foreman to maintain his section of track in his own manner; such a man can be detected by the varying condition of his track sections, for it will be seen that certain sections are well maintained while others are badly run down. The other type of roadmaster, who is alert and actually running the job himself, maintains his subdivision to a more or less uniform standard throughout and escapes the criticism that is directed toward his weak neighbor's subdivision where the roadmaster permits each man to work in his own peculiar manner without giving him proper supervision. Such a roadmaster is found to fall considerably short of measuring up to the requirements of his office. His neighbor, on the other hand, is a real officer who can not only see the trackman's point of view but can also, at the same time, keep in mind the company's best interest by his broader viewpoint.

If I were a roadmaster, I would make it my business to keep abreast of current developments in track maintenance methods and railway transportation in general, by participating in all maintenance of way meetings or conventions available, and by the consistent reading of the proceedings of such organizations as the Roadmasters' Association and of the magazines devoted to the problems of the railway industry. But reading is not enough; I would make notes on what I read and then endeavor to see how new ideas can be applied to the work on my own subdivision.

Jim Teyro, Roadmaster

JIM TEYRO was a roadmaster. For 51 years he worked on the track. He knew no other vocation. In that period of more than half a century, he had worked for only one railroad. And that railway was not a large road as railroads go. It has practically no double track. Neither does it operate any of the deluxe passenger trains that are all too frequently considered representative of American railway service. On the contrary, Jim Teyro spent his active life on a single-track line carrying only a moderate traffic at moderate speeds. His track was, in other words, typical of that vast mileage of lines which comprise the backbone of our transportation system.

And Jim Teyro was a typical roadmaster—proud of his work, loyal to his associates, faithful to his responsibilities. It was because of these characteristics that the management of his railway, the Minneapolis & St. Louis, paid tribute to him, on the occasion of his retirement a few weeks ago, in a booklet of 44 pages, descriptive of his service. And this booklet, dedicated to Jim Teyro, is scarcely less a tribute to that larger group of roadmasters on this and other railways who likewise symbolize that devotion to duty that has long been so characteristic of this group of maintenance officers.

In the words of his management, as set forth in the booklet from which the following is quoted, Jim Teyro went to work as a laborer on a work train two days after he arrived at the home of an uncle in Minnesota from his birthplace, the village of Drahotesice, Bohemia, and in spite of the handicap of an inability to speak or understand English, he lost no time in familiarizing himself with whys and wherefores of his work. He applied himself diligently and faithfully, and with the advantage of a powerful physique and a character that commanded respect, he soon attracted the attention of his superior officers and after only four years of service he was appointed a foreman, directing the work of a floating gang in the summer months and running a section during the winter. For 14 years he was moved from place to place, handling all manner of track work over the entire property—construction as well as maintenance—and during most of this time his wife accompanied him in the



Jim Teyro on His Railroad Above—With One of His Foremen and R. E. Ryan, His Superintendent

capacity of commissary and cook for the small extra gang whose work he directed. It was not until 1901 that he was assigned an established district in the capacity of roadmaster—first for two years at Albert Lea, Minn., and then at Hopkins, which has remained his headquarters and home until this day.

Like every other successful roadmaster, Jim Teyro understands men. He knows how to get along with them and has developed a practical philosophy of the relation of employer and employee. "Our laboring men," he said, "were decent fellows who had families and homes. We never had any bums working for us, never had any serious scraps among our men. I should say that 25 to 30 of our extra-gang men worked for us as long as 15 years each, on an average. Many of our old men would have their sons join our gangs when they were old enough. The average man only wants to be treated 'white.' I cannot think of one case where a man has not responded to a square deal."

Jim's record checks with his statement, for of 19 foremen who worked for him in 31 years, he discharged only one. He speaks of that incident with a tone of real regret in his voice, but he said it could not be avoided.

He also likes to comment on the changes that have taken place in railway standards and practices during the course of his career, for like other roadmasters whose service record goes back 50 years, he has seen remarkable progress.

"Track has changed since I began work when I was a kid. In those days, a white oak tie cost only 45 cents; today, the same tie costs three times as much. Gravel and cinders are the same ballasting materials today as they were in the Eighties, but in those days we used only three to four inches for our tracks to rest on, while today we have eight to ten inches. Ditches were narrow then, they're wider now.

"Then there are rails. The first fish plates were so light you could almost screw on the bolts with your fingers. You can't do that trick today without a real wrench. The old stub switch was with us until about 1892. So, with heavy hard ties, heavy fish plates, now called angle bars, and heavy rails, all put down in a workmanlike way, we have real track today with not much

chance for it to spread or make trouble for anybody."

No men as a group take their responsibilities more seriously than do roadmasters. What this means has been well expressed by Teyro. "I used to be uneasy if I went to a party in the evening. You never can tell what is likely to happen in the railroad business. But after all my scares, I can say that the road never looked for me in an emergency that it was not able to find me in five minutes.

"Funny the way I always have felt when there was trouble nearby. Some folks call that feeling 'having hunches.' I remember once getting off a train at Montgomery, just feeling in my bones that something was wrong. I had no reason for getting off the train, but I did just the same. I just seemed to smell trouble. When I got off, I didn't know what to do, so I walked down the track and when I had gone perhaps 50 yards, I saw a rail loosened and on its side. Just think what would have happened if some train had slipped along just then. Watching tracks means being on the job, and keeping one's eyes open, and looking for trouble every minute so as to put wrong things right."

Zealous effort coupled with wholehearted interest carries its own reward, and this is true no less in trackwork than in other lines of endeavor. Where is the roadmaster whose sentiments are not voiced by these words of Jim Teyro?

"There's nothing that looks so good to me as a nice well-laid, even track, on a fine ballasted right of way, with everything picked up and clean all around. Fences in nice shape, ditches wide and deep, and in good shape to carry off the water, all the weeds out of business, all the old ties picked up and out of the way, everything just fine, that's what I like to look at. It's the finest scenery my eyes ever hope to see."

It is because of these characteristics that William H. Bremner, chief executive of the road, paid tribute to Teyro when he said: "It is with great regret that we see Jim retire at this time. It is with the deepest feeling of affection that we express our gratitude for his honesty, efficiency and devotion to work well done. Jim deserves the host of friends that he has made and that he always will have."

In the words of Elliott E. Nash, chief operating officer, "He knows his business and did his work accordingly. He never needed an alibi. At all times, he was on the job. The management always had such faith and confidence in him that no doubt or concern was ever manifest—in emergency or otherwise—for Jim has been tried many, many times, and never found wanting." In the same vein, R. G. Kenly, chief engineer, referred to Jim as "a most competent trackman of rare good judgment."

Jim Teyro's work is done and his many friends wish him years of rest and contentment, during which he will enjoy the satisfaction of having trained a son, George Teyro, to succeed him in his place as roadmaster.

As the Supply Man Sees Him

(Continued from page 887)

in his track and in the methods of conducting the work of his gangs, and he has too much at stake to permit his judgment to be warped by ulterior motives.

For the same reason he does not take kindly to the idea of being compelled solely for reasons of policy to accept the conclusions of others as to what is best for his track or for the conduct of his work. While he may successfully conceal his feelings, it is but na-

tural that he should bear resentment if he is compelled to adopt innovations without an opportunity to satisfy himself of their merits. The manufacturer's representative is well aware that the introduction of products fostered under such an arrangement gives rise to reactions that are not conducive to sympathetic interest and therefore avails himself of every opportunity to bring his appliance to the direct attention of the supervisory officer.

This question of policy should not be viewed as a mere matter of sales strategy, for lack of first hand knowledge of a device has not infrequently placed the roadmaster in a false position through no fault of his own. In too many cases entirely new devices have been shipped to a roadmaster from headquarters or another division with brief instructions to apply them or put them to use but with entirely inadequate information as to the desired objective or as to the detailed methods of installation or use, without a knowledge of which the appliances cannot be employed successfully. Unless the necessary information is forthcoming, either the supervisory officer, or the appliances, or both will be subjected to unwarranted criticism.

There are, however, other reasons why representatives of the railway supply industry consider the roadmaster a most important factor in the development and promotion of track appliances. Because the roadmaster is closer to the track and its problems than any other railway officer, they have looked to him for first-hand information on the practical problems imposed in the introduction of new appliances. His frank criticisms are solicited and his suggestions for changes of design or improvements are given careful consideration.

Service Tests

The roadmaster is also of inestimable help in the conduct of service trials which must be made under widely varying conditions as to climate, track standards and traffic to insure that the appliances will be subjected to all possible exigencies of service. Not only must the manufacturer rely on him to give the device a fair trial but he must depend on him for an impartial report of the service rendered. Over-enthusiasm is nearly as harmful as lack of interest or outright neglect. In the vast majority of cases, however, he has measured up fully to the confidence placed in him, and his support and fair treatment in such tests of new devices are responsible for much of the advance that has been made in the replacement of hand labor with power-operated equipment. The sympathetic interest he has taken in basic ideas as expressed in experimental models of track appliances has aided in the development and sale of millions of dollars worth of track appliances that have become standard track accessories.

While definitely conservative in his attitude toward any innovation which in his opinion would impose any hazard for train operation or result in a serious disturbance of his established organization, the roadmaster gladly lends his support to new developments that promise improved construction or lower maintenance expenditures. He is willing to try rather than to stand aside until the other fellow has done the pioneering.

Because he is held in high esteem by the railway managements, because he takes such an active interest in advancing track standards and practices, and because he occupies a strategic position with respect to service tests of appliances, it is my opinion that the roadmaster must have a definite place in the sales campaign of any company engaged in the distribution of devices and materials used in track or track work.

Wholesale Painting Methods on t

Concentrated force, housed in model camp train, handles all work on three divisions in accordance with a carefully prepared program

DURING the last two years, the Eastern Pennsylvania general division of the Pennsylvania, which includes the Philadelphia, Middle and Cumberland Valley superintendents' divisions, has been doing practically all of its maintenance-of-way and structures painting with a single gang of painters, which, with a full complement of equipment, is housed in a special paint train which is moved over the road in accordance with a carefully prepared painting program. Experience with this centralized mobile painting force has proved so

man with the title of "engineer paint train."

The painting force ordinarily employed includes, in addition to the engineer paint train, a foreman, two assistant foremen, a helper repairman, 13 painters, 8 painter helpers, a cook and a camp car attendant. With the exception of an assistant foreman and eight of the painters, who are grouped in twos or threes and assigned to special work on the divisions under the engineer paint train, the entire force is housed in the special paint train and is moved over the road as a unit.

Right—View Through a Part of the Recreation Car of the Train



A View into the Kitchen, Dining Car Shown in the Background



Below—The Well-Lighted and Ventilated Dining Room of the Train



Left—Looking Through the Comfortable Sleeping Compartment

effective and economical that the same force has been out on the road again this year in a long summer season of exterior work.

Prior to the concentration of painting forces into a floating or mobile general force, the painting work on the Eastern Pennsylvania division was handled by widely scattered gangs under local master carpenters. From many standpoints this was obviously not the most effective and economical method of carrying out the large painting program involved, and an attempt to improve conditions led to the present arrangement whereby all painters and painting work on the three superintendents' divisions are handled under the direct supervision of one

All painting is done in accordance with a carefully arranged program, prepared as the result of an annual inspection of all right-of-way buildings, bridges, signs and miscellaneous structures by representatives of the chief engineer maintenance of way of the region, the engineer maintenance of way of the general division, and the division engineers of the separate superintendent's divisions. At this inspection, the structures or other units to be painted during the coming year are listed in station order, together with an estimated cost of painting each unit, divided between labor and material. Working limits are also set up for each stand of the paint train and, in fact, various movements of the train are scheduled ap-

on the Pennsylvania

proximately so that the entire accomplishments of a season and the expenditures to be involved can be visualized in advance.

At many places along the road the painting is practically out-of-face, including all station and other right-of-way buildings, track and signal bridges, and all manner of right-of-way and highway crossing signs. At most of the smaller stations the interior is painted, if it requires it, as well as the exterior, but the interiors of the larger buildings are usually passed up during the summer and painted during the winter when the weather will not permit outside painting.

Ride to Work in a Truck

Transportation of the men and materials and equipment to and from the paint train and from job to job during the day, is done by a 1½-ton truck equipped with drop seats for the men, which forms a regular part of the equipment of the painting force. Through the use of this truck the men are kept in supplies during the day, and there is a minimum of time lost in carrying the men to and from work. Only infrequently is it found that the truck cannot drive within a few hundred feet of the work, most of the structures and signs being located at station grounds or highway crossings. Even most of the signal and railroad bridges can be reached conveniently by means of roads paralleling the right-of-way.

In carrying forward the painting program, the gang is split up and each group is assigned certain work. Usually, however, all of the men are employed in the same general vicinity in order to facilitate the work of the truck. The territory covered at the different stands of the train varies in length, depending upon the amount of work and the distance between suitable sidings or spur tracks for holding the train, but ordinarily painting is confined to about ten miles either way from the train. All cleaning and scraping work is done by the men immediately in advance of painting, and the spray method of applying the paint is used wherever possible.

The major items of equipment assigned to the painting force and kept intact in the train when not in use, are given in the following:

- 2 Four-gun Binks paint spraying machines.
- 2 Small one-gun Binks paint spraying machines, gasoline operated.
- 2 Small one-gun DeVilbiss paint spraying machines, one gasoline operated and one electrically operated.
- 11 Paint guns.
- 6 Five-gallon pressure paint containers.
- 2 Pneumatic wire brushes.
- 6 Pneumatic scalers.
- 6 Hand scaling hammers.
- 6 Gasoline blow torches.
- 3 Sets of double-length ladders, maximum length about 28 ft.
- 2 Twelve-foot ladders.
- 10 "A" extension trestles.
- 8 Step ladders.
- 2 Sets of ladder jacks.
- 3 Sets of staging, complete with blocks and falls.

Other equipment provided includes a number of painter's window jacks, numerous smaller items of equipment for hand painting and glazing, a one-ton chain hoist for handling equipment and materials into and out of the supply car, and a gasoline engine-driven pump for securing a water supply for the camp train from wells or springs when pipe line supplies are not within reach.

Most of the paint used by the force is purchased in



Out on the Line, Painting a Signal Bridge
Within a Mile of the Paint Train

paste form and is mixed at the paint train in the quantities desired. At the present time mixing is done by hand, but consideration is being given to the use of mechanical mixers.

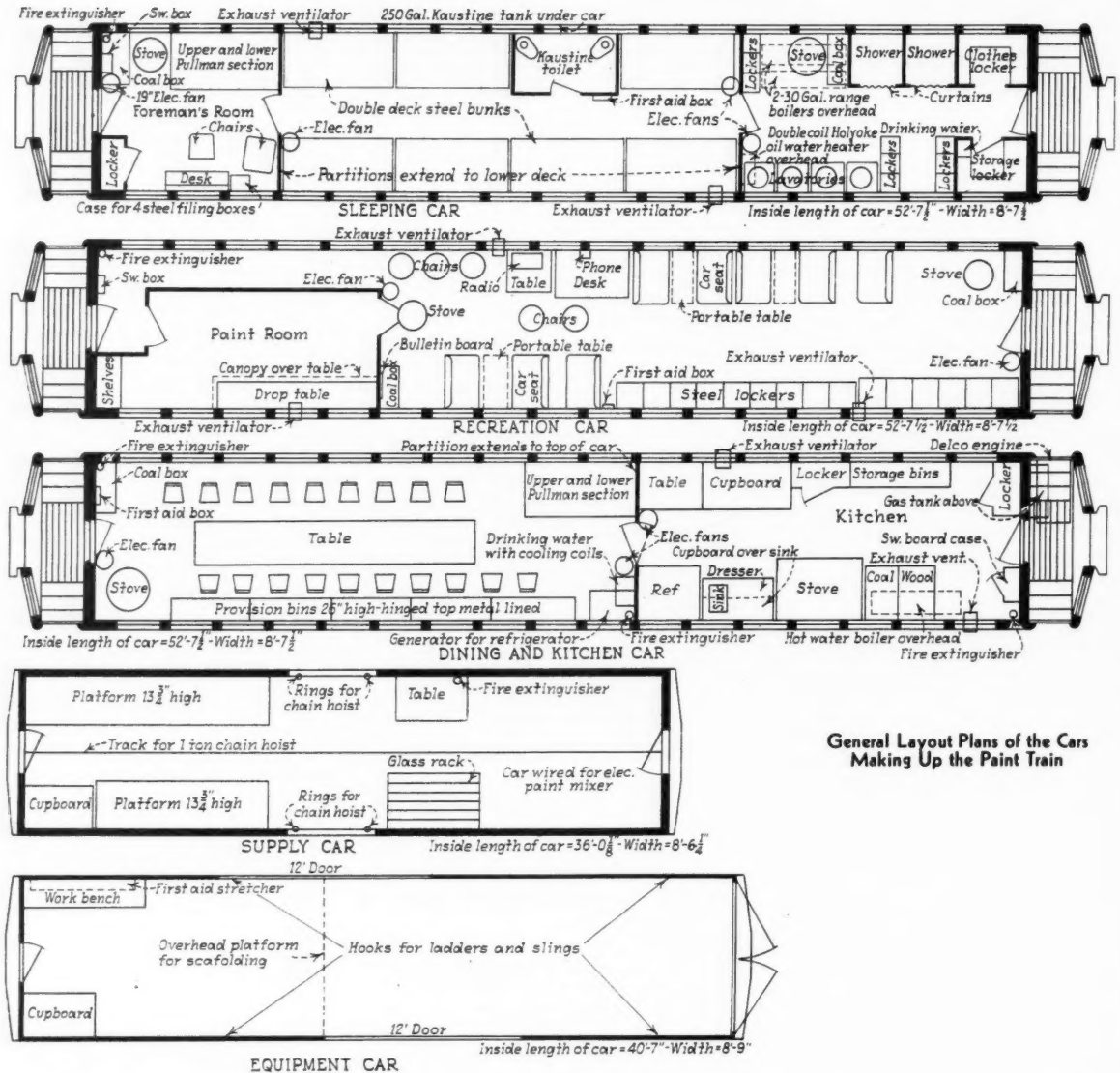
Ideal Quarters Provided for Men

One of the most interesting phases of the painting methods being used on the Eastern Pennsylvania division is the train headquarters of the painting force, which, although constructed and fitted several years ago, embodies all of the most up-to-date features and facilities recognized as desirable for the comfort, convenience and well-being of the men. The train, which was completely assembled and refitted for the purpose at the Altoona shops of the road, consists of a sleeping car, a recreation car, a dining and kitchen car, a supply car, and an equipment car. The first three of the cars mentioned are Pennsylvania PK coaches, which have an inside length of 52 ft. 7½ in. and an inside width of 8 ft. 7½ in., while the latter two cars, used for supplies and equipment, are reconditioned and specially fitted box cars.

The sleeping car, as shown in the accompanying plans, is divided into three main sections, with wash and locker facilities at one end, a foreman's private room and office at the other end, and sleeping quarters for the men in the center. In the sleeping section, which is 25 ft. 8 in. long, there are seven double-deck steel bunks, 6½ ft. long by 3 ft. 1 in. wide, four located end to end along one side of the car and three longitudinally along the other side of the car. At about the middle of the compartment, on the side with the three bunks, is a fully enclosed toilet room, 6 ft. by 3 ft. 5 in., provided with a swinging, air-tight door leading from the center aisle of the car. The toilet room is fitted with two Kaustine dry chemical-type sanitary toilets, which have connections with a 250-gal. waste tank located beneath the car. The unobstructed windows along the sides of the car afford adequate day-lighting and ventilation of the sleeping compartment, but to insure the proper circulation of air in warm weather, and especially in inclement weather



The Paint Train, Set Out in a Small Town, Within Easy Reach of
Water and Food Supplies



General Layout Plans of the Cars Making Up the Paint Train

when the windows must be closed, the compartment is fitted with an exhaust ventilator and an electric fan at each end.

The wash and locker compartment, which is 16 1/2 ft. long and fully partitioned from the sleeping compartment, except for a door, is fitted along one side with four lavatories, six steel lockers, and a general storage locker, about three feet by four feet. The other side of the compartment is divided into space for a general clothes locker similar to the storage locker mentioned, two shower baths, each 2 ft. 10 in. by 2 ft. 11 in., with curtain fronts, a heating stove and coal bin, and three additional steel lockers. The water supply for the lavatories and showers is stored in two 30-gal. range boilers suspended directly over the stove, from which the water is heated. When the train is located within reach of a hydrant water supply, which is frequently the case, the supply tanks of the car are practically floated on the supply line so that there is always adequate water for washing and bathing purposes. Where spring or well supplies only are available, the water can be pumped directly into the storage tank by the gasoline pump unit forming a part of the train's equipment.

The foreman's room, which is at the opposite end of

the car from the wash room, is 10 ft. 3 in. long and, except for a door which is usually kept locked, is fully partitioned from the rest of the car. This room, which is designed to give the foreman private living quarters as well as a field office, is comfortably fitted with a wall desk, two chairs, an upper and lower Pullman section for the foreman and assistant foreman, a large clothes locker, and a stove and coal box.

Electric Refrigeration in Kitchen

The dining and kitchen car has only two main compartments, the dining room, which is 30 1/2 ft. long, and the kitchen, which is about 22 ft. long. In the kitchen, which is partitioned from the dining room, the principal facilities include a large refrigerator, which has been equipped with electric refrigeration, a sink and drain board with a cupboard above, a cooking range with a ventilating hood above and a large coal and wood bin alongside, a serving table, 3 ft. 7 in. by 2 ft. 7 in., another cupboard, 5 ft. long by 2 ft. 7 in. wide, two lockers and a series of low metal-lined storage bins occupying a space 5 ft. 9 in. long by 17 in. wide. These main units of equipment are located along the sides of the car in such man-

ner as to afford the greatest convenience to those working in the kitchen, and at the same time, maximum daylight and air. Artificial means of ventilation, for use during the preparation of meals or at other times desired, are provided for through an electric wall fan and two exhaust ventilators near the roof, one on each side of the kitchen.

The water supply for kitchen purposes is contained in a large tank suspended above the coal and wood bin, entirely out of the way. This is heated from the kitchen range and is piped directly to the sink. As in the case of the wash and shower water supply in the sleeping car, the kitchen supply tank can be refilled or kept filled by the camp pump, or by connecting it to water line hydrants along the right-of-way, in yards or at station grounds, by means of hose carried with the train.

The dining compartment of the car is fitted with a long dining table, covered with oilcloth, 18 individual folding chairs for seating the men at the table, a heating stove and a coal bin at the vestibule end of the car, a series of five metal-lined, hinged-top provision bins, each 4½ ft. long, 14½ in. wide and 26 in. high, along one side of the car, two electric fans, and an upper and lower Pullman section for the use of the cook and camp car attendant. The dining compartment is equipped with a drinking water container, provided with a cooling coil, and also houses the electric refrigeration generator of the refrigerator in the kitchen.

Recreation Car is Comfortable

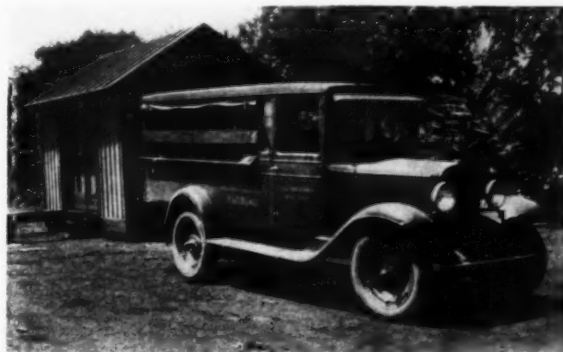
The recreation car of the paint train, which is usually carried between the sleeping and dining cars, is given over entirely for the use of the men in off-duty hours or in bad weather, except for a compartment along one side and toward one end, 13 ft. long by 6½ ft. wide, which is used as a paint room for the painting and lettering of such small signs as are brought to the train. The recreation part of the car contains 3 double coach seats and 15 steel lockers along one side, while the other side is occupied by a heating stove and coal box, 5 double coach seats, a telephone and telephone desk, a radio and radio table, and an aisle along the back of the paint room. Other facilities in the car include portable tables and chairs, a bulletin board, two electric fans, and another heating stove. This second stove is so located that it radiates heat into the paint room as well as into the car proper.

The paint room of the car is merely a room closed off from the rest of the car, where a certain amount of painting of removable pieces, and especially those requiring lettering, can be done under cover. This room has no permanent fixtures other than a series of shelves in one corner and a 9-ft. by 18-in. drop-top painting or work table along the window side. Adequate ventilation of the room can be secured from the car windows, but to insure the best of conditions under all circumstances, a canopy is provided over the painting table, which collects the paint fumes and passes them off through an exhaust ventilator in the side of the car.

The two other cars included in the paint train are specially fitted box cars, one used primarily for the storage of paints and painting supplies and the other for the storage of the painting tools and equipment. The supply car, which is 36 ft. long by 8 ft. 6½ in. wide inside, has both center side doors and end doors and is equipped with the one-ton chain hoist, which can be operated on a monorail throughout its length for the handling of paint drums and other supplies. The main auxiliary equipment provided in this car includes a cupboard, 4 ft. by 2½ ft.; two long paint platforms, 32½ in.

wide by 13¾ in. high; a work table, 4 ft. by 2½ ft.; and a partitioned glass rack, 3 ft. by 5 ft. 3 in. This car is wired for the operation of mechanical paint mixers whenever they are installed.

The equipment car, which is slightly larger than the supply car, 40 ft. 7 in. long by 8 ft. 9 in. wide, has end and side doors, but in this case the side doors are 12 ft. wide and are off center to facilitate the handling of equipment, and especially long ladders and scaffolding, into and out of the car. Furthermore, double doors at one end of the car permit the full opening of that end for storing or removing ladders, or for the loading or unloading of wheeled equipment over inclined rails or



The Gang and Supply Truck Which is a Permanent Part of the Paint Train Equipment

skids. The only special fittings within the car include a cupboard, a work bench, hooks in the side walls for hanging ladders and slings, and an overhead platform at one end for the storage of scaffolding.

Auxiliary Equipment

All of the cars in the train are fitted with fire extinguishers and first-aid kits, and all cars are lighted by electricity, the electric supply being furnished by a Delco engine-generator set housed on the platform of the dining car, just outside of the kitchen. All of the living car floors are covered with linoleum and all windows in these cars are provided with copper screens.

Operation of the paint train is under the direct supervision of the engineer paint train, or the painting foreman in his absence, and with only a few published rules and regulations the train is kept in model condition at all times. All general cleaning within and about the train and the making of the beds, is done by a camp car attendant, who also serves the meals and assists in the kitchen. All meals are prepared by the cook, who is in the employ of the railroad, and the cost of the food supplies is prorated among the men.

Through the painting practice on the Eastern Pennsylvania division, a number of distinct advantages are seen. In the first place the work is concentrated in the hands of a relatively small group of expert painters who can be kept busy the entire year. Painting programs are more readily set up and adhered to; materials and equipment are concentrated largely at one point and are always available for any class of work; and a minimum of time is lost in traveling from job to job and in getting the men to and from the work.

All of the painting on the Eastern Pennsylvania division is done under the general direction of W. F. Miller, engineer maintenance of way, and under the supervision of A. F. Randolph, engineer paint train.

WHAT'S THE ANSWER?



Have you a question you would like to have someone answer?
Have you an answer to any of the questions listed here?

Precurving Rails

When precurving rails, should the middle ordinate be made equal to or greater or less than the actual mechanical ordinate of the curve in which they are to be laid? If greater or less, how much? Why?

Should Equal Mathematical Ordinate

By Engineer Maintenance of Way

While my personal experience with the precurving of rails is limited, I did make a study of this subject several years ago and had a series of rails precurved for test purposes. The curving was done in such a manner that the rails conformed exactly to the curvature for which they were required. They gave excellent service, but it was our opinion, based on the results of these tests, that the benefits to be derived from precurving rails were not commensurate with the cost. For this reason, we dropped the matter and have given it no further consideration.

From this limited experience, it is my belief that in precurving rails the middle ordinate of the rail, as curved, should equal the actual mathematical ordinate of the curve in which it is to be laid.

Should Be Mathematically Correct

By C. E. SANDOVAL

Section Foreman, Southern Pacific, Tubac, Ariz.

When precurving rails, it is of considerable importance that the rail conform as closely as practicable to the mathematical curve of the track in which it is to be laid. As the size and weight of the rail section increase, particularly above the 100-lb. section, this conformity becomes of greater importance. Where the curvature of the rail coincides with the curvature of the track, it is easier to keep it in line and the line holds better than it does if the precurving has not been mathematically correct.

Where an over-curved rail, 30 ft. long, having an ordinate as small as $\frac{1}{8}$ in. greater than the mathematical ordinate of a true curve of, say, 8 deg. or less, is laid in the track, it will always have a kinked appearance that no amount of lining will correct. For this reason, the base bears heavily against the spikes, with the result that they are quickly throat cut. On the other hand, properly

precurved rails give a uniform line and an even bearing against the spikes.

From a practical standpoint, however, it is not always possible to work to the last degree of accuracy, particularly when the precurving is done in the field. Furthermore, within the limits of the curvature for which precurving is required, the effect of small variations in the middle ordinate tends to decrease as the curvature increases. For this reason and because of the impracticability of greater accuracy, the precurving should be done with a view to obtaining a midordinate to the nearest $\frac{1}{8}$ in.

Impracticable to Conform to Exact Curvature

By Division Engineer

My observation leads me to the conclusion that in precurving rails, the midordinate of every rail should equal the mathematical midordinate of an equal arc of the curve in which it is to be laid. Even where this is done with the greatest care, however, it is impracticable

To Be Answered in December

1. When laying rail in the winter, how should the spikes, bolts, nut locks, etc., be distributed to avoid loss of material?

2. To what extent and under what conditions can pile driving be done in the winter? In what respects, if any, do the methods differ from those employed at other seasons?

3. What effect does the width of the ballast shoulder have on track? What determines the proper width? Does it vary with different types of ballast? Why?

4. What methods, if any, can be employed to prevent the heavy sediment from battery-repair shops from entering the shop drains?

5. Should the floor of a section tool house be set above or below the top of rail of the adjacent main track? Why?

6. Should the supply line be the same or of larger size than the water column which it serves? Where two or more water columns are connected to the same supply line, of what size should it be?

7. To what extent can section gangs repair or rebuild fences during the winter? Where this is done, what advance preparation, if any, is necessary?

8. Should structural members, such as girders or floor beams and stringers, that are to be encased in concrete, be given a shop coat of paint? If not, how can they be protected from corrosion while awaiting encasement? If so, should the paint be removed prior to encasement? How can this be done?

with the means ordinarily at hand, to curve the rails at the ends so that they will conform exactly to the arc of the circle. The result is that the joints, particularly those on the inner rail of the curve, exhibit a tendency to kink and throw the track out of line.

One method of overcoming this trouble is to introduce a little more curvature at the quarters than elsewhere in the rail. Under many conditions, however, a better method is to set the rail bender exactly at the ends of the rail and give them a slight kink. To do this, the midordinate should be about 1/16 in. in a total length of 3 ft. The latter practice should not be applied to rails that are to be held on the outside of the curve, but only to those that are to be used on the inside.

I am thoroughly in accord with the conclusions of the American Railway Engineering Association with respect to precurving rails, which, in effect, is that rails need not be precurved for curves such as are usually found in main line track. A precurved rail takes a "dead set" which make it difficult to line. On the other hand, straight rails are very responsive to the movements which are necessary when lining or surfacing them. There are situations, however, such as heavy upgrades where the speed of trains is reduced sharply, in which it is highly desirable to precurve the rail because of the marked tendency of the inner rail to straighten out under the slow-speed traffic. In such cases, considerable benefit can be obtained from precurving the rails for curvatures as low as 3 deg.

Paint Inspection

When should the inspection be made to determine the following season's painting requirements? Who should be in charge and who should accompany the inspection party? What details should be observed? What are the indications that determine whether repainting is required?

Annual Inspections Are Important By District Engineer

Annual inspections are important events in the maintenance of way calendar and they should be given the prestige which this importance demands. Inspections of structures have two primary purposes—to provide a current record of their condition and to collect the basic data from which the following season's maintenance budget can be prepared. Every officer in the several departments who is responsible for the maintenance of the structures should accompany the inspection party or, if this is not practicable, he should be represented. The personnel of the party will, therefore, depend upon the mileage of the road and the type of the maintenance organization. The inspection of the painting should be made at this time.

Since, for purposes of organization and accounting, the operating division is the usual maintenance unit, the inspection should be made by divisions and on each division, it should be in charge of the division engineer, or, if this office does not exist, of the superintendent. The supervisors of bridges and buildings, of track and of water service, the division and system inspectors of bridges and buildings, the division paint foremen and the district engineers should accompany the party. In addition, the engineers of buildings, of bridges and of water service should be present or represented by members of their personal staffs. It is also advisable to have

the section foremen accompany the party over their respective sections.

It is desirable that the inspections on all of the divisions be completed by October 1, in order to give ample time for the preparation of the budget and the requisitions for the necessary material. For this reason, the time of making the inspection on any division will vary with the number of divisions to be included.

Every detail of every structure should be observed, including the painting. The division engineer and the paint foreman should have a record of the date of the last painting of each structure and of any later minor applications or "touching up." The paint should be inspected for cracking, peeling, chalking, washing, spotting, general deterioration and other defects or forms of failure. Careful attention should be directed toward determining whether the surface was prepared properly to receive the paint and whether the application was made properly; whether the paint is loose over any part of the surface; and, on steel surfaces, whether corrosion is taking place below the unbroken paint film. Any one of these is an indication of paint failure, but the determination with respect to repainting will be based on the age of the paint and the progress that has been made by any of these forms of failure.

Supervisor and Inspector Are Sufficient

By F. O. DRAPER

Superintendent of Bridges, Illinois Central, Chicago

On the Illinois Central we have two general bridge inspectors, one on Northern and Western lines and the other on Southern lines. One of their duties is to make a formal bridge inspection on all divisions once every year, so that it will be completed before winter. This inspection is made primarily for the purpose of collecting the basic data for the preparation of the budget for the following year, including the painting of steel bridges. The inspection party also includes the supervisor of bridges and buildings so that both can agree and recommend jointly as to the painting and other work that should be done on each individual structure.

When making the inspection, the age of the paint should always be taken into consideration. Its condition should be noted carefully, the examination being directed toward determining whether it is cracking or peeling; whether it is being destroyed by brine drippings; and whether there are indications of rust nuclei under any unbroken parts of the surface.

Inspection Should Be Thorough

By General Supervisor of Structures

It is my experience that the inspection to determine the following season's painting requirements can best be made by the regular bridge or building inspector during the summer, in connection with his regular inspection trips. For the reason that he may be too critical, however, and outline more work than it would be practicable to carry out, he should be accompanied by his immediate superior so that this part of the maintenance budget will be properly balanced with the remainder of the work that must be done.

Careful attention should be directed toward finding defects in the paint on all structures. If the paint is peeling or shows other signs of imminent failure, the structure should be repainted. If the trouble is over a restricted area, it may be necessary to repaint only part of the structure. Special attention should be directed toward discovering rust spots and incipient rusting of steel structures.

During the inspection it should be noted whether water is leaking down and staining otherwise good paint. If this condition is found, an immediate report should be made so that repairs can be made to overcome this trouble, to the end that the paint will be preserved. The inspector should occasionally scrape off a suspicious patch of paint to see whether it was properly applied, whether the surface had been properly cleaned prior to the application and, on steel structures, whether corrosion is occurring under the paint.



Repairing Valves

To what extent can the water-service forces make repairs to the various types of valves? Is there any economy in their doing so?

May Be Cheaper to Replace

By E. M. GRIME

Engineer of Water Service, Northern Pacific, St. Paul, Minn.

There are three common sources of waste on a railroad, which are not always given the close attention that they deserve. These are losses of water, air and steam, due in large measure to careless handling and neglected maintenance of the piping and particularly of the valves.

Of these three, water waste is usually the most serious or at least the most easily overlooked. While water leakage is frequently in the piping, water escaping under pressure usually shows up at the surface of the ground in a short time, creating an undesirable condition and immediate attention is, therefore, given to repairs. The most serious leakage is generally at the valves, and here it is not always apparent, because the drains from the valve boxes or manholes, connecting with adjacent sewers, carry off the leakage before it accumulates and the water disappears by a route which is not readily seen.

Only those who are experienced in the maintenance and operation of this class of facilities are likely to suspect leakage of this kind prior to the time it is suspected by those who do the accounting and find an unusual increase, either in the water meter figures or the pumping station operating costs. It is, therefore, one of the most important duties of the water service forces to give close attention to know that all valves are kept in good operating condition at all times. These men are usually charged with the maintenance of all cold water facilities and the valves requiring attention may vary all the way from the 14-in. size or larger at a water column or storage tank to the small valves regulating the flow for cooling purposes, drinking water, or other service.

With the larger valves, where removal is costly and also difficult because of interference with regular operation, it is frequently more economical to secure new gates, stems, or other parts for replacement. Small valves, mostly in the one, two, or three-inch sizes, may sometimes develop minor defects which can be readily corrected; but considering the low cost of new valves as compared with labor costs, it usually is more economical to replace with a new valve.

Certain types of hydrant valves which close against a small stop are frequently found defective by reason of the stop piece being broken off or worn. There may be no other serious defect, and in this case provision for a substantial stop block on the hydrant platform or in the pit, holding the operating lever to a definite arc wherein the valve is either wide open or fully closed, may make operation satisfactory for several years.

In many installations, especially on station platforms, replacement of the ordinary wedge type valve with one of a modern design which is always either fully open or fully closed, has materially decreased valve maintenance at these locations. While such valves are much higher in first cost, their installation eliminates water waste so effectively, while the renewal of worn parts becomes so trivial, that their purchase is fully justified for many of the important water outlets required on a railroad.

An efficient water service force anticipates valve trouble or other defects before leakage occurs and the amount of repairing of old equipment which is justified will depend largely on the local conditions and the amount of more important work in progress. There should always be available a supply of new valves in the common small sizes and the most efficient way will usually be to place a new valve as soon as a defect develops and later, at odd times when work may not be pressing, make minor repairs to old equipment, placing it in condition for use elsewhere as required.

Many Can Be Repaired on the Job

By Supervisor of Water Stations

Water-service forces must deal with such a great variety of valves of all sizes for such a wide range of service, that a complete answer to this question would require the writing of a major article. As a general statement, however, there are many valves which can and must be repaired in the job, while others can be replaced and taken to the shop for repairs as time permits. For the smaller sizes, there may be no economy in making the repairs, but as the size increases, the differential between the cost of the valve and the labor cost of repairing decreases, so that above a somewhat elastic line there is real economy in doing so.

As an example, nearly every water-service repair gang has trouble with its tank valves. When one of these valves closes, the side of the lid nearest the hinge pulls down first, scraping the seat, causing extra wear at this point. To overcome this, I tap two 5/8-in. studs into the valve lid, one on each side of the lever. I then fit a cleat above the lever, across the studs, just far enough to clear, and hold it down with lock nuts. This holds the valve seat in a fixed position with respect to the axis of the lever, so that it makes contact at all points at the same time, thus causing it to wear evenly, no matter how much lost motion develops. This is only one of many examples that might be cited, but it will illustrate the fact that repairs are often more economical than renewal. I never attempt to make repairs to tank valves on the job, but keep an extra one on hand for quick replacement when repairs become necessary.

Local Conditions Govern Largely

By R. J. SOUTHCOTT

Water Service Foreman, Canadian National, Toronto, Ont.

When considering the advisability of making repairs to large valves, it will usually be found that local conditions will be the deciding factor, not always whether the repairing of the valve will be economical, but rather whether it can be accomplished. This will depend largely on the nature of the repairs, the importance of the line and of the facility which it serves, the length of the time the line can be taken out of service, the probable duration of the repair period, the accessibility of the valve, and the cost of making the repairs, as compared with the cost of replacement. It is usually the moving parts of such valves that fail. When parts for replacement are

not readily procurable, it may become necessary to make repairs regardless of all other considerations. In our routine work, we frequently make repairs to gates, packing glands, bonnets and stems or spindles, of both the rising and non-rising types, when clear of the lifting thread.

On one occasion we found a piece blown out of the bonnet of a 10-in. gate valve, the dimensions of the break being about $2\frac{1}{2}$ in. by 6 in. There were also three definite fractures ranging from 6 in. to 10 in. long, which were probably the result of freezing at some previous date. Immediate repairs were necessary, since this valve controlled a busy water station and a valve for replacement was not available. We brazed the broken fragment back into the bonnet and similarly welded the fractures. This valve, which is still in service, is only one of several which we have similarly repaired. If an oxy-acetylene outfit is made a part of the water-service department, many such repairs can be made without taking the valves out of service.

With respect to the smaller valves, it is my opinion that, as a general thing, little is gained through the practice of having the water-service forces make repairs. The cost of these valves is small as compared with the labor cost of repairing, except that it is economical to require the renewal of wheels and discs.

Compromise Joints

How can one distinguish between right-hand and left-hand compromise joints when there is no stamping to indicate the one from the other?

Method of Determination Is Simple

By J. J. DESMOND

Division Engineer, Illinois Central, Chicago

A practical method of determining whether a compromise joint is right-hand or left-hand, is to stand in the center of the track, facing the joint. If the heavier or higher rail section is to your left, the joint is left-hand. If the heavier or higher rail is on your right, the compromise joint is a right-hand one.

When compromise joints are properly selected and properly seated against the rail, the contact between the bar and the rail should draw the gage side of the two rails into true alignment. If true alignment does not result, the bars have not been properly selected or are improperly applied. If this occurs, an immediate investigation should be made to determine where the error lies, since the condition may not be a new one. At the best, there will be excessive wear on the rails and the efficiency of the joint will be low.

This Is a Problem of Long Standing

By ALEX CHAPMAN

District Sales Agent, The Rail Joint Company, Chicago

This question is a difficult one to answer, for the reason that compromise joints vary widely in shape for different rail combinations. It is sometimes impossible to tell by looking at the joint which is the end that serves the heavier rail section. In the great majority of cases, however, this can be determined at a glance, and, therefore, whether the bar is "gage" or "out." For this reason, the bars of a "set" can usually be paired without difficulty and the following rule applied:

To determine whether a compromise joint is right-

hand or left-hand, stand in the track and face the joint. When the higher rail is on the right, it is a right-hand joint. If, however, the higher rail is on the left, it is a left-hand joint. If the rails are of the same height, then the joint is right-hand or left-hand as the heavier rail section is on the right or left. Each joint consists of one inside and one outside bar. One right-hand and one left-hand joint form a set.

Sometimes the rails to be connected have heads of almost the same width. In this event, it may not be necessary to make the joints right-hand and left-hand, the two hands being interchangeable. There is also a possibility of confusion where the joints are designed to connect rails of the same height but which have heads of different width.

This is a problem which has existed since compromise joints first came into use. Today all railroads insist on full information as to the right-hand and left-hand features of the joint and to the gage side and out side of the bars, and require that these be marked clearly on each joint bar. All reliable manufacturers now adhere strictly to this practice.

Pile and Timber Trestles

Where a pile or timber trestle continues to get out of line and surface, what defects should be looked for? What methods should be employed to remedy the trouble?

Helper Bents May Be Required

By T. H. BILBREY

Bridge and Building Foreman, Chicago, Rock Island & Pacific, Geary, Okla.

When a pile or timber trestle continues to get out of line, the first thing to look for is crushed timbers, which, if found, should be replaced. The more common cause, however, is settling of the bents, while sometimes the trouble is the result of inadequate or improperly applied sway bracing. The latter cause will more quickly affect trestles on curves. If the sway bracing is at fault, this can be quickly and easily remedied by additional bracing or by a change in the manner of application.

If the trouble is caused by settlement, additional piles or, in some cases, full bents may be necessary. I do not favor the use of timber bents as helpers for pile trestles, particularly if they are to be installed in either still or running water. In either event, a pile bent is much safer.

Cause Indicates the Remedy

By H. D. KNECHT,

Division Engineer, Missouri Pacific, Little Rock, Ark.

Irregularity of line and surface on pile or timber trestles is caused principally by scour around the piles or the footings of timber bents, settlement of the piling, crushing of the caps or stringers at bearing points or track conditions at the approaches to the structure.

If the trouble is caused by scour, the adjacent channel should be cleared of drift or other debris which may have been responsible. Footings should be renewed or bents strengthened and further erosion prevented by rip rap protection.

With the constant increase in the weight of motive power and car loadings, settlement of the bents sometimes occurs from this cause, particularly in the older structures having four-pile bents. The continuation of

such trestles until the full service life has been obtained justifies the strengthening of the bents by driving additional piles, the addition of frame legs on blocking or the installation of helper bents, preferably supported on old pile stubs adjacent to the bent which is settling.

The cause indicates the remedy. Methods of overcoming settlement have been mentioned. Defective timbers which show signs of crushing should be replaced. The maintenance of the approaches is a job for the trackman and proper supervision will insure that this is taken care of.

There Are Two Principal Causes

By A. FINNES

Master Carpenter, Great Northern, Minot, N. D.

When a pile or timber trestle continues to get out of line and surface the cause is generally one of two things: decayed timber or settlement. Decayed or decaying timber crushes and causes the defects in both line and surface. Settlement of the piling may effect both or only the surface.

Present-day power and high-speed trains make it difficult to maintain line and surface on the older trestles, even where they are in an excellent state of repair. Defective timber is easy of detection and should be removed at the first indication of failure. The second and more common trouble, settlement, usually can be remedied only by providing additional support. This can be given by driving piling along side the bent and pulling the pile under the cap. It is often better, however, to drive a pile close to and on each side of the bent, cut them off and insert a short cross timber to assist in supporting the cap. This may be repeated as often as is necessary for the trestle as a whole or for any bent.

A personal experience may be of interest. Several bents of a trestle were driven into quicksand. They settled out of line and surface under every train. Helper piling which were driven afforded no improvement. As a last resort, second-hand stringers, 8 in. by 16 in. by 28 ft., were laid flat on the ground to form a tight floor, with their long dimension transverse to the track. Timbers were then laid longitudinally on this floor and bolted to each pile to form a solid mat. By this means further settlement was prevented.

Many Causes Produce These Effects

By Assistant Engineer of Bridges

Many causes operate to throw pile or timber trestles out of line and surface, but there is one characteristic that is common to all cases, whatever may be the basic cause. Trestles get out of line and surface only when the bents or decks are not rigid. Perhaps the most common cause of poor line is bad track on the embankment at the ends of the structures. Where this condition exists the locomotives and cars come onto the trestle swaying, with the almost invariable result that, if the cause is not removed, the bridge will soon be out of line.

Another cause that is more frequent in pile trestles than it should be is the failure to give sufficient batter to the piles. Where this occurs, the trestle is quite certain to sway under trains, as it also is if the proper amount of sway bracing has not been installed. In either event, the structure remains out of position so that it is difficult, if not impossible, to maintain good line. Other causes of poor line are loose chord bolts, loose packing blocks and lateral shifting of ties that are not properly anchored against this movement.

As the structure becomes older, there is an increasing tendency toward crushing of the timbers. Stringers

crush at the bearing on the caps and the caps crush over the piles, both of which affect the surface and perhaps the line. Again, some or all of the piles in a bent may settle, while the bolts in the sway bracing get loose.

The cause indicates the remedy, assuming that a complete renewal is not required. Additional piles for support or to prevent swaying may be necessary. Double sway bracing is sometimes all that is needed. All bolts in chords and sway bracing should be kept tight and any unsound timbers should be renewed. If the trouble is on the embankment, the track here should be kept in good line and surface.

Lack of Penetration Sometimes at Fault

By H. BECKER

Section Foreman, St. Louis-San Francisco, Rush Tower, Mo.

I have often observed that pile trestles get out of line because the piling does not have sufficient penetration to afford a proper support for the train loads. In some cases, I am sure that the trouble was, basically, that slender piling were driven in soft marshy ground, and that better results could have been obtained by the use of larger and, perhaps, longer piles.

In several cases on this road, trouble of this sort has been overcome by placing concrete around the weak bents. This method increases the stiffness of the bent, while it also affords greater resistance to the imposition of the vertical loads. The results have been very satisfactory, as no further trouble has been experienced with either line or surface.

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Tamping Ties

When surfacing, should the tamping be done over the full distance between the rail and the end of the tie? If not, how far should it extend? Why?

Tamp as Far out as Practicable

By I. H. SCHRAM,

Engineer Maintenance of Way, Erie, Hornell, N. Y.

Tamping should always be carried out as near to the end of the tie as practicable. On tangent track with hand tamping in either stone or the softer type of ballast, it is practicable to tamp clear to the end and this should be done. Ties should always be tamped thoroughly on both sides, and the tamping should be carried under the rail and inside for at least 12 in. The remainder of the space near the center should be merely filled in.

On tangent track, if the tamping is done by power tools, as, for example, pneumatic tampers, it is practicable to tamp thoroughly to within about three inches of the end of the tie. It is not possible, however, to extend the tamping further than this as the ballast will be forced out of the shoulder.

On curved track, care must be exercised not to spoil the cross level when the track is being tamped either by hand or with power tools. On stone ballast, if the tamping is extended to the ends of the tie, there is a chance that the track will be lifted off its bed on the other side. It is advisable, therefore, not to tamp too close to the end of the tie. For this reason, about three inches from the end of the tie is the limit. Track on curves should be tamped as solidly inside as out for at least 12 in. from the rail and under the rail seat. The desirability of tamping as close to the end of the tie as

practicable is to counteract the rolling tendency which all ballast exhibits, which causes it to work out from the end of the tie, resulting in center-bound track. To make this practicable, however, it is necessary that the tamping be done with equal thoroughness, otherwise broken-end ties will result.

Should Extend to the End

By J. V. NEUBERT

Chief Engineer Maintenance of Way, New York Central, New York

Tamping depends largely on the stiffness of the rail, the type of ballast and the volume of traffic. As a general rule, when surfacing, the tie should be tamped for a distance not less than 8 in. nor more than 12 in. inside the base of each rail. From these points, the tamping should extend continuously to the ends of the tie. On the low side of curves, particularly where the speed of traffic varies rather widely, the tamping should extend from two to four inches farther inside the rail than on tangents.

Great care should be exercised in tamping to insure a uniform bearing for the bottom of the tie. No tie should ever be tamped harder on one side or end than on the other. Foremen should sound the ties behind the surfacing to satisfy themselves that the tamping has been done uniformly throughout.

The part of the tie near the center should be tamped, but much more lightly than is done over the remainder of its length. If the center is tamped with the same thoroughness, the track quickly becomes center-bound, which causes choppy riding and creates an uncomfortable sensation for passengers. In addition, a refined alinement cannot be maintained on certain-bound track.

Does Not Tamp Clear to the End

By H. BECKER

Section Foreman, St. Louis-San Francisco, Rush Tower, Mo.

My practice in surfacing track is to tamp under the rail and for about 16 in. inside, doing the job thoroughly and uniformly. The same care is used over a part of the distance outside the rail, but as the end of the tie is approached, the tamping is done much more lightly, about as is done at the center of the tie. In other words, the ballast should be packed lightly but not crowded under the ends. It is my observation that where this method is used, there is less likelihood of broken ends among the ties that are slated for renewal this year or next. By analogy, I assume that this method of tamping is easier on the ties that are in better condition.

Leaves the Ends Untamped

By R. ROSSI

Yard Foreman, Alton, Chicago

In giving an answer to this question, I wish to qualify it somewhat, by saying that a practice that may be most satisfactory under some conditions of ballast and roadbed may not be adapted for other conditions. For this reason, I will confine my discussion to the case of main-line track where the roadbed is ample and well drained and where there is sufficient ballast under the ties as well as plenty for a standard ballast shoulder. The type of ballast may be disregarded, provided it is clean.

Under these conditions, it is my opinion, based on long experience with different kinds of ballast and densities of traffic, that the tamping should be uniform and thorough from a point about 12 to 16 in. inside the rail to a point about 4 in. from the end of the tie. If there

is any lack of uniformity, the best tamping should be done under and for a few inches on either side of the rail.

My reasons for this opinion are based on the fact that the load of the moving wheels, as it is transmitted through the rail, is concentrated on the ballast immediately below the rail and decreases gradually away from this point. Observation also confirms this conclusion, because this part of the bearing of the tie is crowded down more than it is away from the rail. For this reason, when the tie is tamped solidly clear to the end, it may be that after a time it is better supported at the end than under the rail. The result is that it may break at the end, or under the rail, unless it is in sufficiently good condition to withstand the strains to which it is subjected.

For Good Surface, Tamp to the End

By C. E. SANDOVAL

Section Foreman, Southern Pacific, Tubac, Ariz.

Regardless of the type of ballast, ties should be well tamped under the rail, for a distance of 12 to 16 in. inside the rail and the full distance from the rail to the end. When ties are tamped in this manner, there is no danger of their breaking at the ends, while center-bound track is also avoided. Uniform tamping done in this manner preserves the surface and holds the line for a longer time.

Some foremen tamp thoroughly under the rail and for the proper distance inside, but do not tamp for the full distance between the rail and the end of the tie. It is my observation that this practice is not to be recommended, since both line and surface get out of refinement quickly and, if not given immediate attention deteriorate rapidly. To maintain good line and surface under modern train loads and speeds, a full and uniform bearing under every part of the tie is a matter of prime necessity, except at the center of its length, for reasons known to every trackman. Furthermore, the life of ties that are not provided with such a bearing is shortened perceptibly.



Coal Pockets

Should the pockets of locomotive coaling stations be lined? If so, what material should be used and how should it be applied? How can repairs be made?

Steel Plates Make Best Lining

By General Inspector of Buildings

There are several reasons why coal pockets should be lined. In the first place, the abrasion of the sides or bottom of the bins caused by the falling or the sliding of the coal is quite severe whether the structure is of wood or concrete. In the second place, neither material, and this is particularly true of wood, provides satisfactory surfaces for the sliding of the coal toward the delivery gate.

Steel plates provide the most satisfactory sliding surface, since there is a minimum of friction between the metal and the coal, and with constant use, they become polished, thus further reducing the abrasive action. Furthermore, they also offer maximum resistance to the wear that is caused by the impact of the falling coal when the bin becomes empty.

Steel plates having a minimum thickness of $\frac{1}{4}$ in. should be used in lining pockets of coaling stations where any considerable volume of coal is handled. At

the heavier stations, this thickness can be increased. The plates should be cut to shape and closely fitted at the joints to provide, as nearly as practicable, a continuous sliding surface which offers no obstruction to the free movement of the coal. If the structure is of wood, countersunk wood screws can be used to secure the plates to the floor and sides of the bin. If it is a concrete structure, there are several forms of inserted anchors on the market which are suitable for this purpose, but whatever device is used, the heads of the anchors should be countersunk.

With this form of lining, there is little difficulty in making repairs, because when the plates become worn, new plates can be applied in the same manner as at first. One of the advantages of this method of applying the lining is that maintenance is reduced to a minimum and repairs are seldom needed until the plates are worn out. If they are of the proper thickness only a few renewals will be required during the life of the plant.

Timber Pockets Should Be Lined

By FRANK R. JUDD,

Engineer of Buildings, Illinois Central, Chicago

Overhead storage bins or pockets of timber coaling stations should be lined with steel plates to enable them to withstand the abrasion caused by the sliding coal. This lining should be placed along the slopes, in the valleys and on the sides of the storage bins. The thickness of the metal used for this class of work will be determined by the service demanded of the facility. If the station handles a considerable volume of coal, heavy sheets should be used, but in no case should they be lighter than No. 10 U. S. gage.

The lining should be cut to fit the pocket, with the joints butted, and should be secured by means of drive screws. Care should be exercised to eliminate all openings which might permit an accumulation of coal dust under the lining, since an accumulation of fine dust may result in spontaneous ignition. Repairs to the lining of storage bins thus constructed can be made readily in the same manner as for the original application.



Guard-Rail Clamps

When installing guard-rail clamps, should the wedge be placed against the guard rail or against the running rail? Why?

Practice Should Be Uniform

By ROBERT WHITE

Section Foreman, Grand Trunk Western, Drayton Plains, Mich.

Uniformity of practice is desirable in this matter as in most others. For this reason, on any division, the wedges should all be on the same side. I have seen the installations made in both ways and have never observed any difference in the service results, so far as securing the guard rail is concerned. The guard rail should be bolted to the running rail through the filler blocks, so that longitudinal movement of the rail will not affect the wedge.

One of the difficulties frequently encountered with guard-rail clamps is the failure to get the shoes which fit the guard rail and the main-track rail in the proper grooves. If this detail is neglected, the driving of the wedge is likely to form a kink at the clamp, the strain sometimes being sufficient to break the clamp.

Less Vibration on Guard-Rail Side

By G. J. SLIBECK

Chief Engineer, Pettibone Mulliken Company, Chicago

It has always been my practice to install the wedge of guard-rail clamps on the guard rail side. There are two excellent reasons why this should be done. First, the vibration and other movements of the running rail tend to loosen the wedge when it is placed against this rail, while these factors are much less noticeable on the guard-rail side. Second, there is always some danger of putting a kink in the running rail when the wedge is driven, if it is against this rail.

Should Be Against Guard Rail

By A. A. MILLER

Engineer Maintenance of Way, Missouri Pacific, St. Louis, Mo.

It is of the utmost importance that the wedge of a guard rail stay in place and function at all times, since, where guard-rail clamps are used, the safety of facing-point movements depends in large measure upon its doing so. It is equally important that it be so placed that any movement can be detected easily and quickly without the necessity of making a detailed inspection. These are basic reasons for selecting the location of the wedge, which is most easily seen from a motor car or a moving train, when placed against the guard rail.

Fits Guard Rail Better

By E. E. BOYER

Retired Roadmaster, Missouri Pacific, De Soto, Mo.

In my opinion, based on long experience with guard-rail clamps, the wedge should be applied against the guard rail rather than against the main-track rail. A properly designed wedge fits snugly against the web and between the head and flange of the rail, so that, if placed against the guard rail, it gives additional protection by exerting a leverage which resists the tendency of the guard rail to cant or turn over.

Place So As to Facilitate Inspection

By R. ROSSI

Yard Foreman, Alton, Chicago

My observation indicates that there are no advantages derived from placing the wedges of guard-rail clamps against the running rail, but that there are definite advantages in placing them on the guard-rail inside. The principal advantage of the latter practice is that it facilitates inspection. If placed against the guard rail, they can be seen from a motor car or the rear of a train. Furthermore, this position of the wedge conserves the time of the track walker and, in many instances, insures a better inspection of this important track device.

Less Likely to Be Damaged

By T. H. BILBREY

Bridge and Building Foreman, Chicago, Rock Island & Pacific, Geary, Okla.

From long experience in track work, I am of the opinion that the proper position of the wedge which holds the clamp in position is against the guard rail. In the first place, it is less likely to be damaged, and in the second place, it can be observed more readily so that any movement or looseness is easier of detection. Furthermore, since the running rail is held rigidly to the ties while the guard rail is adjustable, this position of the wedge tends to hold the latter more firmly to the rail.

Smoothing Track

A further answer to the following question which was discussed in the September issue:

During the tie-renewal season, how much time, if any, should be allotted to smoothing the track? Should this time be regularly assigned or left to the judgment of the local section forces? ?

Will Be Governed by Local Conditions

By A. W. WEHNER

Roadmaster, Southern Pacific, Lake Charles, La.

It is essential that some time be allotted for keeping the track in smooth-riding condition during the tie-renewal season. The amount of time that may be necessary will be governed by local conditions. On a well-maintained section of average length which does not have any chronic bad places, one day a week should be sufficient.

This is a matter, however, which should be worked out between the roadmaster and the foreman. While it is desirable to set a regular time for this work, such a plan does not always prove to be practicable. For this reason, I prefer to leave the matter to the judgment of the foreman. At the same time the roadmaster, who is in close touch with the riding qualities of the track and other conditions, should exercise close supervision to insure that the foreman is exercising good judgment in this regard.

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Repairing Leaks in Pipes

A further answer to the following question which was discussed in the September issue:

What methods can be employed to repair leaks in underground water lines? ?

A Method not Widely Known

By E. D. SWIFT

Engineer Maintenance of Way, Belt Railway of Chicago, Chicago

There is one very successful method of effecting permanent repairs to cast-iron bell and spigot lead-calked joints that was not mentioned in the answers to this question, which appeared in the September issue. This omission would seem to indicate that the method is not so generally known as its merits warrant.

It is common experience that leaded joints that are located under railway tracks are prone to develop leaks as a result of the loosening of the lead by the vibration which is induced by traffic. It is equally well known that such leaks are usually difficult to repair, while the cost of doing so is relatively high owing to the complications introduced by the tracks and traffic. Furthermore, conditions attending recalking or the use of new lead are frequently such that it is difficult to make a satisfactory job of the repairs.

For many years the Belt Railway has used a special design of clamp, a proprietary device, in repairing all leaks occurring in the joints of cast-iron bell and spigot pipe, without a single known case of recurring leakage. These clamps are also used in new installations where the joints come under tracks, as a precaution against the development of leaks.

Meeting the Crisis

(Continued from page 883)

The motor car affords a good means for making detailed inspections of track. No roadmaster should measure his efficiency by the mileage covered in a given time; rather, his purpose should be to stop with each gang and instruct them sufficiently in their methods of work to insure that they will render the maximum return for their expenditure. He should give especial attention to the foreman in charge of a small gang to see that he does as much work as his best men.

Real savings can be made today by the most conservative use of crossties—not by arbitrarily reducing the number to be renewed, but by determining the renewals in full accord with track conditions, since it is as much a waste to maintain track that is inadequately supported as it is to remove ties before the expiration of their full life. Most roadmasters intend to go into this subject thoroughly, but frequently, through engagements of less importance, fail to make the desired checks of the requisitions of their foremen that are necessary to adequate supervision. Special provisions should be made now for the roadmasters to cover their entire districts with their men to determine the number of renewals actually required.

Handling Vegetation

In these days of drastic retrenchment, it is well to recognize that nothing is gained by allowing weeds to grow in track because of inability to secure the usual chemical weed killer or other means for their destruction, for a dense growth of vegetation will do more to create irregular line and surface than the labor required to remove it. Many times the weed line is narrowed for the purpose of reducing the cost of weeding but such action retards drainage, retaining moisture in the ballast at or above the level of the bottom of the ties and subjecting the ties to a churning action under traffic that has a very destructive effect. When such suggestions are made, a roadmaster must be willing to face criticism by holding out against methods that are economical only in superficial appearances.

An Elastic Program

Less supervision is required by a roadmaster when his foremen work to a set program. Such a plan may result in waste in these days. For instance, a foreman may adhere too rigidly to the work of renewing cross ties, with the result that the riding condition of his track is neglected. The most satisfactory plan provides that a foreman shall give sufficient attention to the condition of his track to keep it up to standard during any period. A roadmaster will be encouraged to get his ties in as quickly as possible, but he must not neglect his other work and must keep continually after his surface and line. Instances are not unknown where deterioration has continued unnoticed until it has culminated in an expensive breakdown. After all, a roadmaster cannot now hold a foreman responsible for detecting irregular track and applying his efforts with best results. This is the roadmaster's task and one of the important reasons for the creation of his position. Again it is evident that if he is to be of the maximum value to his road, a roadmaster must go beyond mere compliance with the many details that come to him through regular routine and apply as much energy as possible to other important work, which, while perhaps not yielding immediate glory, will slowly but surely be beneficial to his railroad.



NEWS OF THE MONTH

Conclude Hearings on Rate Increase

Hearings for the taking of testimony on the application of the railroads for a 15 per cent increase in freight rates, which were conducted by the Interstate Commerce Commission, were concluded on September 5, with the adjournment of the hearing at Chicago. Hearings had previously been held at other important points in various parts of the country. Final arguments were presented at Washington on September 21, and the commission is expected to render its decision on the application in October.

Mexico Taxes Motor Vehicles

As a means of limiting the severe competition which highway transportation agencies are offering the railroads in the states surrounding the Federal District of Mexico, the Mexican government has recently passed a law providing for the taxation of motor buses and trucks operating outside of the Federal District. The tax amounts to 2 per cent of the gross earnings of freight trucks and 5 per cent of those of highway passenger vehicles, with a minimum of \$12 per month for trucks up to 3 tons capacity and of the same amount for buses up to a capacity of 12 passengers.

Emphasizes Disparity Between Bus and Railroad Taxation

A striking contrast between the amount of taxes paid the state by railroads and those paid by bus lines was drawn recently by the state auditor of Mississippi in a public statement, which brought to light the fact that the railroads operating in Mississippi pay a direct tax to the state of slightly less than \$4,000,000 a year, while bus lines pay something less than \$18,000. The total assessed valuation of the state of Mississippi is \$742,504,531, of which amount \$95,235,782, or more than one-eighth of the total, is assessed against the railroads, whereas the bus lines have little if any tangible property that can be taxed, the statement said. The state auditor calls attention also to the fact that if the railroads are reduced to such a condition, by highway and other competition, that it will become necessary for the

Federal Government to take them over, the state will lose the benefit of railroad taxes. The general public will then be called upon to bear the burden of the \$4,000,000 in taxes that the railroads are now paying.

Canadian Express Companies Lower Rates to Meet Competition

Express companies in Canada have recently filed with the Railway Commissioners of Canada new tariffs affecting more than 300 points where it is known that truck lines have taken the heavier and more desirable traffic. The new rates are approximately the same as the trucks have been charging and it is planned to extend these rates to other points throughout the Dominion. The express companies feel that they are in a better position to compete with truck lines than the railways, for the reason that they can give pick-up and delivery service with their own vehicles. Truck lines are charged by the express companies with unfair methods in the solicitation of freight, particularly through the extending of special rates to favored shippers.

Southwestern Lines Establish Family Bargain Fares

A new innovation in railway passenger fares has been instituted by the Southwestern lines, which, on September 24-26, offered family bargain fares good returning until October 6. The rates are fixed on a sliding scale so that the round-trip rate per person varies with the number of persons transported. The rates are so designed to induce the organization of parties and the taking of the family along at little additional cost. For example, the regular round-trip adult fare from St. Louis, Mo., to Dallas, Tex., is \$48.06, while under the new rates one adult ticket costs \$26, two adults on one ticket \$41.60 and five adults on one ticket \$55. Using the round-trip rate of \$55 for 5 adults and the mileage of 767 between St. Louis and Dallas, the rate per person amounts approximately to 8 mills per mile.

Water Cars on the Katy

By operating water cars ranging in capacity from 6,300 gal. to 15,550 gal., in connection with freight locomotives, the Missouri-Kansas-Texas has effected

considerable economies in the use of fuel and in addition is securing more efficient operation of freight trains, by permitting better train movements and increased train loading. The saving has been accomplished through the use of these cars, which now number 48, by the elimination of water stops. A recent test, over a period of 15 days, on 5 of the 6 operating districts showed fuel savings of \$2,878 on the operation of 708 trains. When the Katy first began to experiment with water cars, rebuilt oil tank cars were brought into service, but as the success of the experiment became evident, a number of specially designed cars were constructed in the Katy shops.

Freight Cars and Locomotives

In the first seven months of 1931, the railroads of the United States placed 8,264 new freight cars in service, as compared with 55,660 and 42,552 in the same periods of 1930 and 1929, respectively, according to the Car Service division of the American Railway Association. New locomotives placed in service in the first seven months of this year totaled 94, as compared with 484 last year and 371 in the same period of 1929. On August 1, the railroads had 7,984 new freight cars on order, as compared with 19,627 cars on the same day last year, while the locomotives on order on August 1 this year totaled 32, as compared with 296 on the same day of last year.

Two States Move to Halt Reckless Operation of Buses

Efforts to curb the reckless operation of buses on interstate routes through Rhode Island and Connecticut have recently been undertaken by the motor vehicle departments of these two states. The Rhode Island State Board of Public Roads has suspended the licenses of 29 interstate bus drivers, according to recent reports, while the Connecticut Motor Vehicle Commissioner has notified the highway police of that state that, in the absence of regulatory legislation by Congress, the Connecticut laws apply to interstate buses as well as to other motor vehicles. The action of the Rhode Island board was based on a secret investigation by the board's agents, which showed that some operators were driving with passengers aboard at speeds ranging from 40 to 60 miles per hour. The

action of these two states follows that of the New Jersey commissioner of motor vehicles, who recently ordered summary arrests for interstate bus operators who are found to be violating the New Jersey traffic act.

Great Northern Opens New California Line

Train operation over the California extension of the Great Northern was commenced on September 15, when a trainload of 50 cars of pine products left McCloud, Cal., for Minneapolis, Minn., and St. Paul. The consignment was from the McCloud River Lumber Company and was handled over the McCloud River railroad to a point on the Great Northern's California extension, and thence over this extension. This line reaches from Klamath Falls, Ore., south to Bieber, Cal., where it is to make a connection with an extension of the Western Pacific north from Keddle, Cal. November 2 has been set tentatively as the date for the official spike driving that will connect the Great Northern and the Western Pacific at Bieber, thereby giving the Great Northern a direct route into San Francisco. Freight service from the East to San Francisco will begin shortly after the completion of the line, but passenger trains will not be run until late next spring when the Empire Builder of the Great Northern will begin service between Chicago and San Francisco, Cal., over the new route.

Southwestern Lines File Pick-Up and Delivery Tariff

After several months of negotiations, the Southwestern lines have prepared and filed with the Interstate Commerce Commission and the respective state commissions tariffs providing for the pick-up and delivery of l. c. l. freight at some 3,000 stations in the southwest and in a portion of the western trunk line territory. The tariffs provide that pick-up and delivery service will be offered without charge on l. c. l. freight, with certain exceptions, which moves a distance not in excess of 300 miles. Although such service has been offered by individual carriers heretofore, this is the first instance in which all of the railways in a territory of substantial area have acted jointly in instituting the service. The store-door service will be provided by motor trucks, for which the railways, acting individually, will contract with drayage companies located in the affected cities and towns. The tariffs will become effective on October 1.

Ship California Fruit to New York by Truck and Steamship

An experiment to determine the practicability of transcontinental motor freight service was begun on August 29, when a truck and trailer carrying 20 tons of dates and walnuts left Los Angeles, Cal., for New York. The truck and trailer unit, which was equipped with refrigeration service, was scheduled

to stop in 25 important shipping centers. It was estimated that the trip to New York would take about 12 days. The experiment is being sponsored by the General Motors Corporation.

Another move is under way to determine the feasibility of transporting California grapes and highly perishable deciduous fruits to the Atlantic coast by water. On September 12, the California Growers' and Shippers' Protective League dispatched a sample shipment of 4,500 boxes or packages of table grapes for New York aboard the Panama Pacific Line's steamship "Virginia." This cargo is being carried in one of the ship's ventilated cold rooms.

Freight Traffic Still Low

Freight traffic moved by the Class I railroads in the first seven months of 1931 amounted to 204,602,756,000 net ton-miles, a reduction of 43,238,050,000 net ton-miles, or 17.4 per cent, under the same period of 1930 and of 27.1 per cent under the corresponding period of 1929, according to reports compiled by the Bureau of Railway Economics. The total for July amounted to 30,275,956,000 net ton-miles, a reduction from July, 1930, of 5,318,083,000 net ton-miles, or 14.9 per cent.

Seven Months' Return of Class I Carriers is 2.19 Per Cent

For the first seven months of 1931, the Class I railroads of the United States had a net railway operating income of \$295,085,044, which was at the annual rate of return of 2.19 per cent on their property investment, as compared with a net income of \$460,448,586, or 3.48 per cent, in the first seven months of 1930, according to reports compiled by the Bureau of Railway Economics. Operating revenues for the seven months totaled \$2,564,583,852, as compared with \$3,149,353,490 for the same period in 1930, a decrease of 18.6 per cent. Operating expenses totaled \$1,996,901,513, as against \$2,405,567,388 in the previous year, a decrease of 17 per cent. In the seven months' period of this year, these roads paid \$193,544,950 in taxes, as compared with \$211,632,286 for the same period in 1930, a decrease of 8.5 per cent. Thirty-five Class I railroads operated at a loss in the first seven months.

Railway Employment Declines Further

A further reduction in the number of railway employees took place between the middle of June and the middle of July, according to the Interstate Commerce Commission's preliminary statement on railway employment as of the latter date. The number was 1,309,794, a decrease of 7,614 as compared with the number in June. This was a reduction of 14.49 per cent as compared with July, 1930, and of 24.94 per cent as compared with July, 1929. The number of maintenance of way employees was 34.97 per cent less than in July, 1929, while the number of train and engine service employees was 21.14 per cent less.

ASSOCIATION NEWS

Metropolitan Track Supervisors' Club

The next meeting of the Metropolitan Track Supervisors' Club will be held on Thursday, October 22, 1931, at Keens' Chop House, 72 West Thirty-sixth street, New York City. Dinner will be served as usual, at 6:30 p. m., and will be followed by the regular business meeting.

Maintenance of Way Club of Chicago

The eleventh annual meeting of the Maintenance of Way Club of Chicago, which marks the completion of ten years' activities of this organization, will be held at the Auditorium Hotel on Wednesday evening, October 21, following a dinner which will be served at 6:30 p. m. The program will include a short business session and the election of officers.

American Wood-Preservers' Association

The executive committee will meet in St. Louis, Mo., on October 20 to complete the program and to consider other plans for the next convention which will be held in St. Louis on January 27-29, 1932. R. L. Allardice, general superintendent of the International Creosoting & Construction Co., Texarkana, Tex., has been elected to honorary membership in recognition of his long and constructive service on behalf of the industry.

American Railway Engineering Association

A detailed report on rail stresses and locomotive tracking characteristics of the electric locomotives used by the Great Northern in the Cascade mountains, will be published in a bulletin to be distributed shortly to the members of the association. This report is the work of J. Paul Shamberger, engineer, railway engineering department, and B. F. Langer, engineer, research department, of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., and is based on extensive tests conducted on the Great Northern with equipment designed to determine the stresses in the rails and the behavior of the locomotives. The report was reviewed by Dr. A. N. Talbot of the University of Illinois, who is chairman of the Special Committee on Stresses in Track.

Nine committees held meetings during the month of September. The Committee on Rivers and Harbors met at Washington, D. C., on September 2; the Committee on Economics of Railway Labor at St. Louis, Mo., on the 14th; the Committee on Records and Accounts at Detroit, Mich., on the 15th; and the Committee on Masonry at Montreal, on the 17th and 18th. Four other commit-

tees held meetings in Chicago—the Committee on Roadway on the 19th; the Committee on Track on the 24th and the Committees on Grade Crossings and on Ties on the 25th.

Bridge and Building Association

As stated in the September issue, the Executive committee, at a meeting in Chicago on August 29, voted to postpone to October 18-20, 1932, the convention that was originally scheduled to be held in Toronto, Ontario, on October 20-22 of this year. Action was also taken reducing the dues to \$2 for all members in good standing at the end of the fiscal year terminating October 1. T. H. Strate, engineer of track elevation, C. M. St. P. & P., was appointed third vice-president to fill the vacancy created by the death of W. T. Krausch. E. C. Neville, bridge and building master, Canadian National Railway, Toronto, Ontario, was appointed fourth vice-president, succeeding Mr. Strate. W. R. Roof, bridge engineer, Chicago Great Western, was appointed director of the unexpired term of Mr. Neville.

Track Supply Association

The Track Supply Association held a meeting at the Auditorium Hotel, Chicago, on September 22, to which a number of railway officers were invited, for the purpose of discussing ways in which this association could assist the railways in meeting the conditions imposed by the present crisis. The tentative draft of a resolution, directing attention to the primary causes of the current predicament of the railways, was offered for discussion and upon invitation, comments were made by R. H. Ford, assistant chief engineer, Chicago, Rock Island & Pacific; C. T. Dike, chief engineer, Chicago & North Western; T. J. Thomas, assistant to president, Chicago, Burlington & Quincy; F. H. Johnson, assistant to president, Chicago, Milwaukee, St. Paul & Pacific; Lem Adams, engineer maintenance of way, Union Pacific System; and R. V. Fletcher, vice-president and general counsel, Illinois Central. The resolution will be submitted to the membership of the association by letter ballot and efforts will be made to enlist the co-operation of other associations of railway supply manufacturers.



On the Route of the Chicago-Detroit Express, Grand Trunk Western

PERSONAL MENTION

General

Edward P. Bracken, vice-president in charge of operation of the Chicago, Burlington & Quincy and the Colorado & Southern and allied lines, at one time a roadmaster on this road for 13 years, has been appointed executive vice-president, with headquarters as before at Chicago, to succeed **Conrad E. Spens**, deceased. Mr. Bracken has been in the service of the Burlington for more than 44 years. He first became associated with



Edward P. Bracken

the road in August, 1887, as a gang foreman on the Lincoln division, being appointed extra gang foreman on the Wyoming division in September, 1888. After serving in this position for a year, he was made track foreman, which position he also held for a year, being then promoted to roadmaster, in which capacity he served for 13 years. At the end of this period, he was made trainmaster and in November, 1905, he was promoted to assistant superintendent of the Lincoln division. A year later, Mr. Bracken was further advanced to superintendent and served successively in this capacity on the Lincoln, Sterling, Sheridan, Brookfield and Galesburg divisions. He

was promoted to general superintendent of the Wyoming division on May 15, 1909, being on February 1, 1910, further advanced to the position of assistant general manager of the Lines East of the Missouri river, with headquarters at Chicago. He was promoted to general manager of the Lines East in August, 1912, and five years later, he was made operating vice-president, and when the government took over control of the railroads during the war, he was appointed federal manager of the Burlington. On the termination of government control in 1920, he was re-appointed vice-president in charge of operation, which position he held until his recent appointment, effective September 24.

Engineering

R. W. Ross, division engineer on the Canadian National, with headquarters at Edmonton, Alta., has been appointed assistant to district engineer at the same point. The position of division engineer at Edmonton has been discontinued.

J. V. Neubert, chief engineer maintenance of way of the New York Central, with headquarters at New York, has been appointed also to the same position on the Michigan Central and the Cleveland, Cincinnati, Chicago & St. Louis.

C. C. Cuninghame, trainmaster of the Chicago, Rock Island & Pacific, with headquarters at Herington, Kan., has been appointed division engineer at the same point, to succeed **H. M. Long**, who has been transferred to Kansas City, Mo. Mr. Long replaces **J. T. Fitzgerald**, who has been assigned to other duties.

G. M. O'Rourke, district engineer of the Western Lines of the Illinois Central, with headquarters at Waterloo, Iowa, has had his jurisdiction extended to include the Northern lines, with headquarters at Chicago. **W. R. Gillam**, district engineer of the Northern lines, with headquarters at Chicago, has been appointed division engineer of the Iowa division, with headquarters at Ft. Dodge, Iowa, succeeding **N. R. Hill**, who has been assigned to other duties. **M. B. Morgan**, district engineer of the Yazoo & Mississippi Valley, has had his jurisdiction extended to include the Southern lines of the I. C. and the Gulf & Ship Island, with headquarters as before at Memphis, Tenn. The position of district engineer of the Southern lines and of the Gulf & Ship Island, which has been held by **J. E. Fanning**, with headquarters at New Orleans, La., has been abolished and Mr. Fanning has been assigned to other duties. **J. E. Rogan**, division engineer of the New Orleans terminal with headquarters at New Orleans, has been transferred to McComb, Miss.,

where his jurisdiction will include the Louisiana division and the Gulf & Ship Island, the New Orleans terminal having been absorbed by the Louisiana division. Mr. Rogan succeeds **C. M. Chumley**, who has been transferred to the Kentucky division with headquarters at Louisville, Ky., succeeding **P. Glynn**, retired. Following the abolition of the Wisconsin division and its absorption by the Chicago Terminal and the Springfield division, **S. C. Jump**, division engineer of the Wisconsin division with headquarters at Freeport, Ill., has been assigned to other duties. The Tennessee division has been absorbed by the St. Louis, Kentucky and Mississippi divisions, and **S. J. Holt**, division engineer of the Tennessee division, with headquarters at Fulton, Ky., has been appointed division engineer of the Mississippi division, with headquarters at Water Valley, Miss., where he succeeds **T. M. Pittman, Jr.**, who has been assigned to other duties.

George H. Burnette, whose appointment as assistant chief engineer of the Pittsburgh & Lake Erie, with headquarters at Pittsburgh, Pa., was announced in the September issue of *Railway En-*



George H. Burnette

gineering and Maintenance, was born at Hartford, Ohio, and was graduated from the Ohio Northern University. Mr. Burnette began his early railroad career with the Pittsburgh & Lake Erie, and then went with the Monongahela in the engineering department, with which road he has been connected for the last 25 years. For the last eight years, prior to his appointment as assistant chief engineer of the P. & L. E., he was chief engineer of the Monongahela.

C. E. Cherry, assistant division engineer on the Missouri Pacific, with headquarters at Pueblo, Colo., has been promoted to division engineer of the Illinois division and of the Missouri-Illinois Railroad (unit of the Missouri Pacific) east of the Mississippi river, exclusive of the river transfer, with headquarters at Bush, Ill. The duties of division engineer at Bush were formerly assigned to **H. A. Israel**, assistant superintendent, who has been appointed trainmaster at the same point. The position of assistant division engineer at Pueblo has been

left temporarily vacant. **J. R. Nagel**, division engineer at St. Louis, Mo., has had his jurisdiction extended to include the Missouri-Illinois west of the Mississippi river, including the river transfer.

Fred J. Nannah, who has been appointed engineer maintenance of way of the Pittsburgh & Lake Erie, with headquarters at Pittsburgh, Pa., as announced



Fred J. Nannah

in the August issue, was born at New Brighton, Pa., and was graduated from Geneva College, Beaver Falls, Pa. Shortly after his graduation, he became connected with the Pittsburgh & Lake Erie as a chainman on the engineering corps, and since then has been in the constant employ of this road. Mr. Nannah was promoted successively through the positions of rodman, transitman, assistant engineer, and valuation engineer and engineer of construction, which latter position he was holding at the time of his recent promotion to engineer maintenance of way.

Lem Adams, general supervisor maintenance of way of the Union Pacific System, has been promoted to the newly created position of system engineer maintenance of way, with headquarters



Lem Adams

as before at Omaha, Neb. The position of general supervisor maintenance of way has been discontinued. Mr. Adams has been in the service of the Union Pacific continuously for more than 22 years. He was born on June 6, 1886, at

Buda, Tex., and graduated from the Texas A. & M. College with the degree of bachelor of science in civil engineering. He entered the service of the Union Pacific System in June, 1909, as a rodman on the Oregon Short Line, becoming a draftsman a year later. From June, 1911, to March, 1916, he served successively as an estimator and as chief draftsman. Mr. Adams was promoted to assistant division engineer on the latter date, being appointed engineering accountant in 1917 and contract engineer in 1918. A year later he was transferred to the Union Pacific unit of the system with the title of special field engineer in the maintenance of way department, then being advanced to roadway assistant of the system, with headquarters at Omaha, in April, 1920. On May 15, 1929, Mr. Adams was made general supervisor maintenance of way, at Omaha, which position he held until his recent promotion, effective September 16.

The creation of the position of system engineer maintenance of way of the Union Pacific comes as a result of the abolition of the positions of engineer maintenance of way on three of the operating units of the Union Pacific System—the Union Pacific Railroad, the Oregon Short Line (noted in the September issue) and the Oregon-Washington Railroad & Navigation Co. **S. H. Osborne**, engineer maintenance of way of the Union Pacific, with headquarters at Omaha, Neb., has been appointed division engineer of the Colorado division, with headquarters at Denver, Colo. **L. W. Althof**, engineer maintenance of way of the Oregon Short Line, with headquarters at Pocatello, Idaho, has been appointed division engineer of the Idaho division with the same headquarters. **H. A. Roberts**, engineer maintenance of way of the Oregon-Washington Railroad & Navigation Co., has been appointed division engineer of the Oregon division, with headquarters as before at Portland, Ore., succeeding **L. V. Chausse**, who has been transferred.

Track

G. P. Hall, roadmaster on the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Cle Elum, Wash., has moved his headquarters to Cedar Falls, Wash.

F. H. Pflaging, assistant supervisor on the Long Island, New York zone of the Pennsylvania, with headquarters at Patchogue, N. Y., has been transferred to Jamaica, N. Y., succeeding **E. L. Wingfield, Jr.**, resigned.

B. Violett, general roadmaster of the Fort Worth & Denver City (a subsidiary of the Chicago, Burlington & Quincy), with headquarters at Ft. Worth, Tex., retired on September 1, with a service record of 52 years with the Burlington and its subsidiaries.

S. H. Morgan, roadmaster on the Southern, with headquarters at Knoxville, Tenn., has been appointed assistant roadmaster, with the same headquarters.

H. H. Stine, roadmaster at Norfolk, Va., has been appointed assistant roadmaster at the same point. **C. T. Vance**, assistant roadmaster, has been appointed supervisor of track, with headquarters as before at Asheville, N. C.

H. A. Metcalfe, roadmaster of the Alabama Great Southern, with headquarters at Birmingham, Ala., has had his jurisdiction extended over the New Orleans & Northeastern, with the same headquarters, succeeding **C. R. Gates**, who has been made assistant roadmaster on the same road and of the New Orleans Terminal Company, with headquarters at Hattiesburg, Miss. All three companies mentioned above are parts of the Southern railway, lines west.

James Bury, roadmaster on the Canadian National, with headquarters at Napadogan, N. B., has been transferred to the Moncton division, with headquarters at Moncton, N. B. Mr. Bury succeeds **J. R. Armstrong**, acting roadmaster, who retains his headquarters at Moncton, but who now has jurisdiction over other subdivisions of the same division.

Following the consolidation of the Knoxville and Atlanta divisions of the Louisville & Nashville, **C. L. Stark**, roadmaster of the Knoxville division, with headquarters at Knoxville, Tenn., has been appointed roadmaster of the combined divisions with the same headquarters. **J. E. Lockhart**, roadmaster of the Atlanta division, with headquarters at Etowah, Tenn., has been transferred to Birmingham, Ala., with jurisdiction over the Birmingham Mineral and Alabama Mineral divisions. Mr. Lockhart succeeds **A. C. Kinne** and **C. E. Haynie**, roadmasters of the Birmingham Mineral and Alabama Mineral divisions, respectively, who have been assigned to other duties. Following the consolidation of the Mobile & Montgomery, and the New Orleans & Mobile divisions under the name of the Montgomery & New Orleans division, **Owen Crawford**, roadmaster on the New Orleans & Mobile division, with headquarters at Bay St. Louis, Miss., has been appointed roadmaster on the new division, with headquarters at Mobile, Ala.

Bridge and Building

J. J. Steadham, supervisor of bridges and buildings of the New Orleans & Northeastern (part of the Southern) with headquarters at Hattiesburg, Miss., has been appointed assistant supervisor of bridges and buildings, and the position of supervisor of bridges and buildings on this line has been abolished.

H. M. Bryant, whose promotion to bridge and building supervisor of the Southern Kansas and Central divisions of the Missouri Pacific, with headquarters at Coffeyville, Kan., was noted in the September issue, was born on March 3, 1888, at Downs, Kan. After a public school education, he entered railway service on April 8, 1909, in the bridge department of the Northern Kansas division of the Missouri Pacific. For the

next 11 years, he served on this and the Omaha divisions as a bridge carpenter, water service repairman and bridge foreman. In October, 1920, he was promoted to inspector of water service in the chief engineer's office, with headquarters at St. Louis, Mo., which position he held until August 16, 1930, when he was appointed assistant bridge and building supervisor of the Southern Kansas and Central divisions. His further promotion to bridge and building supervisor of these divisions took place on July 16.

Elmer J. Johnson, assistant supervisor of bridges and buildings on the Northern Pacific, with headquarters at Glendive, Mont., has been promoted to supervisor of bridges and buildings at Jamestown, N. D., to succeed **Thomas Stang**, who has been transferred to Spokane, Wash. Mr. Stang succeeds **J. B. Skibeness**, who has been assigned to other duties. The position of assistant supervisor of bridges and buildings at Glendive has been abolished.

Kemper Peabody, general supervisor of buildings on the New York Central, Buffalo and East, retired from active service, with pension, on September 1, after 30 years' service with this road. Mr. Peabody, who was born on August 2, 1861, at Plymouth, Wis., was educated in the public schools and Shattuck Military school. His first railway service was with the Duluth & Iron Range from September, 1888, to June, 1889, as a rodman and transitman. From the latter date until January, 1891, he was employed in general construction and survey work in North Dakota, and was then elected to the state legislature, where he served until April, 1893. After leaving the legislature he became engaged in appraisal and surveying work for the U. S. government, but a short time later was appointed state bank examiner of North Dakota. After two years in this position he again engaged in appraisal and surveying work for the government, until April, 1897, when he went with the Chicago Great Western, at Dubuque, Iowa, as a masonry inspector. In June, 1901, he entered the service of the New York Central as a building inspector, which position he held until January, 1909, when he was appointed assistant supervisor of buildings. In October, 1918, he was promoted to supervisor of piers and buildings, and in July, 1925, he was promoted to general supervisor of buildings, the position he was holding at the time of his retirement.

Obituary

Walter H. Raleigh, roadmaster on the Terminals division of the Southern Pacific Lines in Texas and Louisiana, with headquarters at Houston, Tex., died on July 28, at his home in that city.

A. R. Ponder, executive assistant to the vice-president of the Missouri Pacific Lines and vice-president of the San Antonio, Uvalde & Gulf, who was an engineer by training and early experience, died suddenly on September 10 at Asherton, Tex. Mr. Ponder, whose head-

quarters were at San Antonio, Tex., was at one time assistant chief engineer of the St. Louis, Kennett & Southern (now part of the St. Louis-San Francisco).

Elmer Zarbell, assistant engineer in the office of the chief engineer of the Louisville & Nashville, with headquarters at Louisville, Ky., died on September 10 at that place. Mr. Zarbell, who had been with the L. & N. for 31 years, had charge of the location and operation of many miles of new lines, as well as a number of important engineering structures.

Edwin H. McHenry, formerly chief engineer of the Northern Pacific and the Canadian Pacific, and also vice-president of the New York, New Haven & Hartford, who died on August 22 at Ardmore, Pa., as announced in the September issue, was born at Cincinnati, Ohio, on January 25, 1859. He was educated at Pennsylvania Military College, where he received a degree in 1876 and an honorary degree 16 years later. He began his railroad career with the Northern Pacific as a rodman in 1883, and in 10 years advanced to the position of chief engineer. He was chief engineer of the Canadian Pacific from 1902 to 1904 and in the latter year, he became vice-president of the New York, New Haven & Hartford. The electrification work on that road was carried out under his direction. He established the consulting engineering firm of McHenry & Murray, at New Haven, Conn., in 1914, at which time he relinquished his railroad duties. He retired from active practice two years later.

William Bretschneider, assistant division engineer of the Houston division of the Southern Pacific Lines in Texas and Louisiana, with headquarters at Houston, Tex., died on August 4. Mr. Bretschneider was 54 years of age and had been with the Southern Pacific Lines for nearly 28 years. He was born on November 5, 1876, and after graduating from the Texas Agriculture & Mechanical College, entered the service of the Southern Pacific on October 3, 1903, as an instrumentman. He was advanced to assistant engineer and then to assistant superintendent, and was holding the latter position in 1913, when ill health forced him to retire from active service for a short time. He returned to the service of the Southern Pacific as division engineer at El Paso, Tex., and in August, 1917, again assumed the position of assistant superintendent, with headquarters at Houston. In 1920, Mr. Bretschneider was re-appointed to the position of division engineer and held this position until a short time before his death, when he was made assistant division engineer.

Loss and Damage Claims Decrease

Claims paid by the railroads for loss and damage during the first six months of 1931 amounted to \$14,159,626, as compared with \$19,274,899 during the same period of last year, a decrease of \$5,115,253, or 26.5 per cent, according to figures compiled by the Freight Claim division of the American Railway Association.

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SUPPLY TRADE NEWS

General

The Page Steel & Wire Co., Bridgeport, Conn., has opened a southeastern district sales office at 1520 Healey building, Atlanta, Ga. **R. J. Teeple** has been placed in charge.

The Gardner-Denver Company, Quincy, Ill., has completed arrangements with the **Interstate Machinery & Supply Co.**, Omaha, Neb., whereby the latter has an agency in Omaha and vicinity for Gardner-Denver products.

The Massey Concrete Products Corporation, Chicago, has transferred its Central District office from the Dixie Terminal building, Cincinnati, Ohio, to 908 Midland Bank building, Cleveland, Ohio.

The National Acme Company, Cleveland, Ohio, has entered into a license agreement with the **Dardelet Threadlock Corporation**, New York, to manufacture, use and sell bolts, nuts and screw machine products threaded with the Dardelet self-locking screw thread.

The Hopkins-Benedict Company, Chicago, has taken over the distribution, factory sales and service of the **Portable Power Tool Corporation**, Warsaw, Ind., for all railroads in the United States. **Harry D. Stops** has been elected vice-president and treasurer and **A. C. Thom** has been appointed sales and service engineer.

The Ames-Baldwin-Wyoming Shovel Company, Boston, Mass., has been organized following the sale of shovel manufacturing assets of Beall Brothers, Alton, Ill., the Ames Shovel & Tool Co., Boston, the Pittsburgh Shovel Company, Pittsburgh, Pa., the Wyoming Shovel Company, Wyoming, Pa., the Baldwin Tool Company, Parkersburg, W. Va., and Hubbard & Co., Pittsburgh. The executive offices of the new company are located at North Easton, Mass. The officers are: President, **Richard Harte**; sales manager, **N. T. Jacobs**; and treasurer, **L. J. Reay**.

The Woodings Forge & Tool Co., Verona, Pa., has purchased the plant and tool business of the **Verona Tool Works**, Verona, which will be operated under the name of the **Woodings-Verona Tool Works**, with plant and general offices at Verona. The Verona Tool Works has changed its name to the **Oakmont Forgings Company**. The track tool business formerly handled by the Woodings Forge & Tool has also been taken over by the Woodings-Verona Tool Works, but the former company will continue with the promotion and sale of the Woodings track specialties, including the Woodings rail anchor, switch point protector, and rail and flange lubricator.

Personal

William B. Turner, division sales manager of the **Truscon Steel Company**, at Youngstown, Ohio, has retired.

H. S. Strouse, advertising manager of the **Harnischfeger Corporation**, Milwaukee, Wis., has been elected treasurer.

Charles H. Gayetty has been appointed sales representative at Philadelphia, Pa., for the **Louisville Frog, Switch & Signal Co.**, Louisville, Ky.

LaMonte J. Belnap, president of the **Worthington Pump and Machinery Corporation**, Harrison, N. J., has been elected chairman of the executive committee. He is succeeded by **Harry C. Beaver**, vice-president.

W. C. Bruton, sales engineer for the **American Manganese Steel Company**, Chicago Heights, Ill., with headquarters at Oakland, Cal., has been appointed district sales manager for the Pacific Northwest territory, which comprises Oregon, Washington, British Columbia and the Coeur D'Alene district in Idaho.

Jonathan A. Noyes, manager of the **Sullivan Machinery Company**, with headquarters at Duluth, Minn., has been promoted to manager of the company's coal machinery sales division, with headquarters at Chicago, and has been succeeded by **Leon J. Cone**, representative, who has been appointed district manager.

B. T. Ehrnman, formerly in the Chicago office of the **International-Stacey Corporation**, Columbus, Ohio, has been transferred to St. Louis, Mo., as division manager, with offices in the Railway Exchange building. **C. B. Coldwell**, who also was formerly located in Chicago, has been transferred to the Ft. Worth, Tex., office of the **International-Stacey Corporation**.

Walter H. Gardner, advertising manager of the **Caterpillar Tractor Company**, Peoria, Ill., has been appointed manager of the newly-created Specialty Sales division. Mr. Gardner will direct the company's activities in promoting sales to railroads and public utilities, as well as in marketing caterpillar engines and sub-assemblies to other manufacturers. **G. M. Walker** has been appointed advertising manager to succeed Mr. Gardner.

R. C. Todd, assistant general sales manager of the **American Rolling Mill Company**, Middletown, Ohio, has been appointed assistant vice-president. **H. M. Richards**, manager of the Cleveland (Ohio) sales district, has been appointed assistant general manager of sales to succeed Mr. Todd. Mr. Richards has been succeeded by **Foster E. Wortley**, and **O. L. Conley** has been appointed assistant manager of the Cleveland sales district.

H. E. Chilcoat, manager of sales of the air dump car division of the **Koppel Industrial Car & Equipment Company**, Koppel, Pa., has been appointed general manager of sales, with headquarters at Koppel. Mr. Chilcoat was born at Orbin-

sonia, Pa. He served a machinist apprenticeship with the Pennsylvania and two years after the completion of this course entered the employ of the Westinghouse Air Brake Company, where he



H. E. Chilcoat

remained for 13 years, first as a mechanical expert at Richmond, Va., and later as commercial representative at Pittsburgh, Pa. In 1918, he left that company to go with the Clark Car Company as general manager, remaining in that position until 1926. During the next two and one-half years he was engaged in special consulting commercial engineering work, and since October 1, 1928, has served with the Koppel Industrial Car & Equipment Company as manager of sales of the air dump car division, which position he held until his recent appointment as general manager of sales of the same company.

Emanuel Woodings, president of the **Woodings Forge & Tool Company**, has become president of the newly formed **Woodings-Verona Tool Works**. Mr. Woodings, long an employee and later an officer of the Verona Tool Works,



Emanuel Woodings

started with that company in 1887 as an apprentice machinist. After learning the machinist's trade, he became foreman of the machine shop, and later foreman of the forge shop. During this time he developed many of the machines used in the manufacture of present-day track tools. From the forge shop, Mr. Woodings became general manager, and later

Announcing

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Applied or Removed with a Spike Maul

THIS new UNIT ANTI-CREEPER is designed to meet the specifications of railroads which prefer a rail anchor that can be applied or removed without the aid of a special tool.

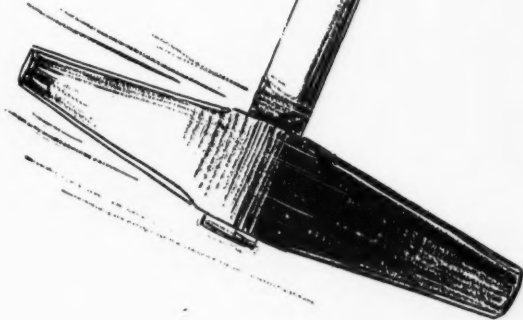
One good healthy blow with a spike maul is sufficient for either operation. *Note the new design* which makes this possible. It is also impossible to overdrive the anchor.

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was appointed vice-president and general manager. Three years after his appointment to vice-president and general manager, or in 1923, Mr. Woodings resigned his connection with the Verona Tool Works to organize the Woodings Forge & Tool Company, of which he became president.

William A. Irvin, vice-president in charge of plant operation of the American Sheet & Tin Plate Company, has been elected a vice-president of the **United States Steel Corporation**, in connection with manufacturing operations, with headquarters at New York. Mr. Irvin was born at Indiana, Pa., and was educated in the public schools and the night courses of the Indiana State Normal School. In 1888, he served as a telegraph operator on the Pennsylvania and later as clerk and assistant freight and ticket agent at Indiana. In 1895, he went with the P. H. Laufmann Company, Ltd., Apollo, Pa., sheet and tin plate manufacturers, as a shipping clerk, and later held various positions until he



William A. Irvin

became superintendent. When this company was taken over in 1900 by the American Sheet Steel Company, he served in the general offices of the latter company, and in 1904, when it was merged into the American Sheet & Tin Plate Company, he went to Pittsburgh as assistant to the operating vice-president of the new company. From November, 1925, until his recent election as a vice-president of the United States Steel Corporation, Mr. Irvin has served as vice-president in charge of plant operations of the American Sheet & Tin Plate Company.

Obituary

William H. Wattis, president of the Utah Construction Company and head of Six Companies, Inc., died on September 13, at San Francisco, Cal., after a long illness. Mr. Wattis, who had been active in railroad construction work in the west, was 73 years of age.

Edward Douglas Jackson, general manager of the Syntron Company, Pittsburgh, Pa., who died on August 18, as announced in the September issue, was born at Front Royal, Va., in 1882, and

graduated from the Virginia Military Institute in 1902. In 1903, he entered the service of the Baltimore & Ohio and was advanced to assistant engineer maintenance of way in the general office at Baltimore, Md. He left this road in 1918 to go with the Chipman Chemical



Edward Douglas Jackson

Engineering Company, Inc., of New York, of which company he was later appointed vice-president. In 1922, Mr. Jackson joined the Syntron Company as general manager, which position he held until his death.

Alfred H. Mulliken, formerly president and one of the founders of the Pettibone Mulliken Company, Chicago, who died on September 2, as announced in the September issue, devoted 60 of the 63 years of his active career to the railway supply business, during 48 years of which time he was connected with the Pettibone Mulliken Company. His career began on November 1, 1868, when, at the age of 15, he entered the service of Crerar, Adams & Co., Chicago, as an office boy. Twelve years later, he joined with Asa G. Pettibone, a banker, to form



Alfred H. Mulliken

the firm of Pettibone & Mulliken. In 1885, the firm was incorporated as Pettibone, Mulliken & Co., with Mr. Mulliken as secretary and treasurer. It was this firm that began the manufacture of the Jenne track-jack and the roller rail bender. In July, 1912, the company was re-organized under the name of the Pettibone Mulliken Company, and from

that time until 1928 Mr. Mulliken served as president. In 1922, he joined in the organization of the investment banking firm of Mulliken & Roberts of New York, of which company he served as president and chairman of the board until his death. In 1928, he disposed of his holdings in the Pettibone Mulliken Company and went to reside at New Canaan, Conn., where he remained until his death. Mr. Mulliken was a director of the National Association of Manufacturers, the Continental Illinois Bank of Chicago and the Railway Business Association.

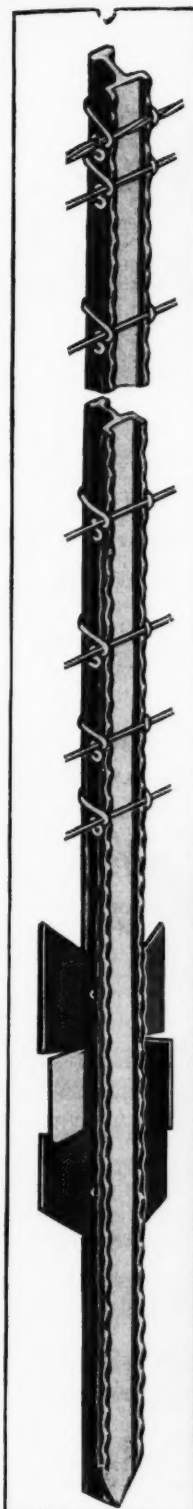
John E. Nelson, president of Jos. E. Nelson & Sons, Inc., Chicago, died at Green Lake, Wis., on September 4, following a lingering illness. He was born on October 13, 1881, and after finishing high school, learned the trade of brick layer. After following this trade for a year or two, he entered the employ of Nelson & McLeod, railroad contractors, as field superintendent, in charge of



John E. Nelson

work for western railroads. In 1904, he was appointed general superintendent and was made a partner and general manager of the firm when it became known as Jos. E. Nelson & Sons. Upon the death of his father in 1921, the business was taken over by the sons as a partnership and on February 10, 1930, Jos. E. Nelson & Sons, Inc., was incorporated by John E. Nelson and William H. Nelson to take over the general contracting business of the partnership, Jos. E. Nelson & Sons. At this time, John E. Nelson was elected president, which position he has held until the time of his death. Mr. Nelson had been active in the Bridge and Building Supply Men's Association.

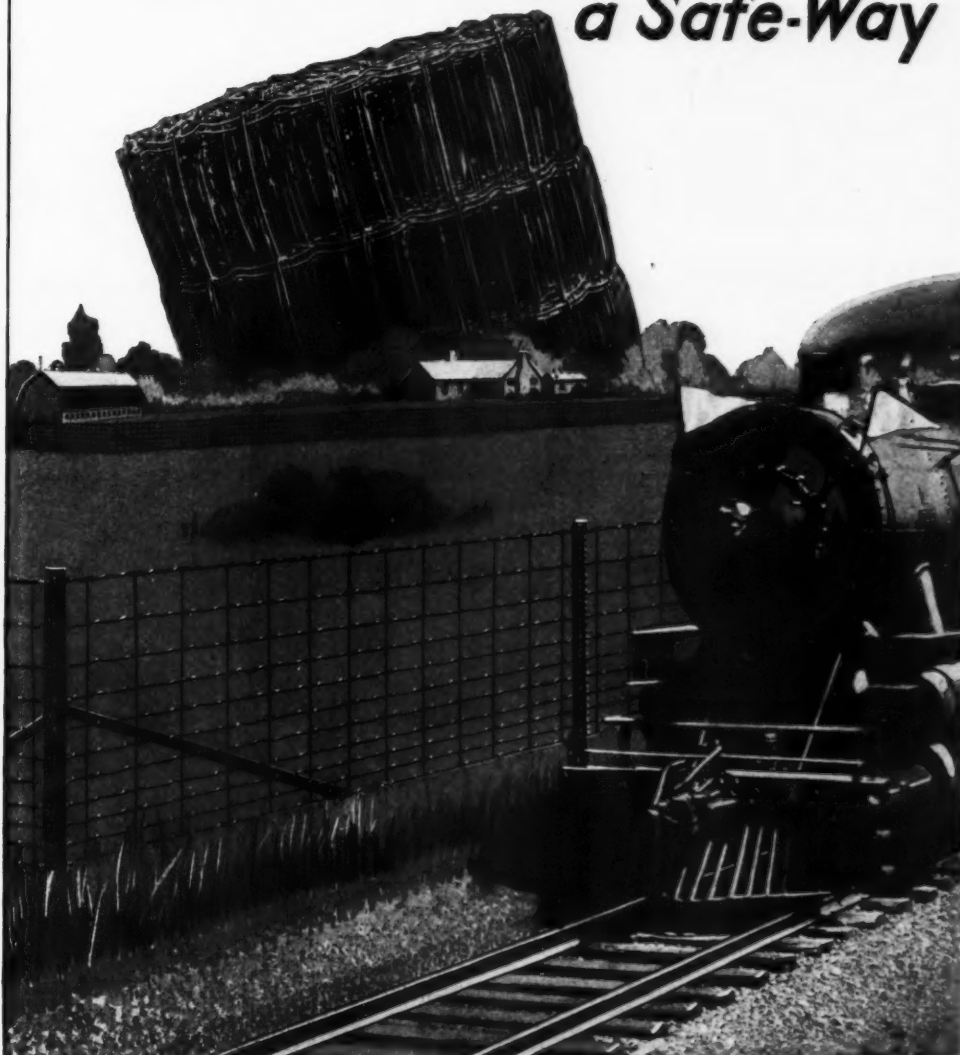
Railroad Calcyanide.—The Calcyanide Company, New York, has issued three folders, known as Forms A, B and C, each of which discusses a different aspect of the problem of vermin destruction on railroads and the application thereto of Railroad Calcyanide. A description of this product, the thorough manner in which it operates to kill vermin of all kinds and the advantages of its use through increased employee efficiency are some of the subjects discussed.



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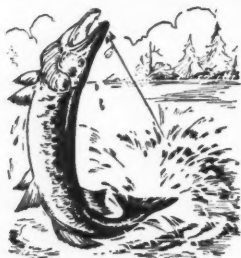
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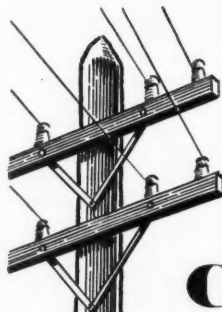
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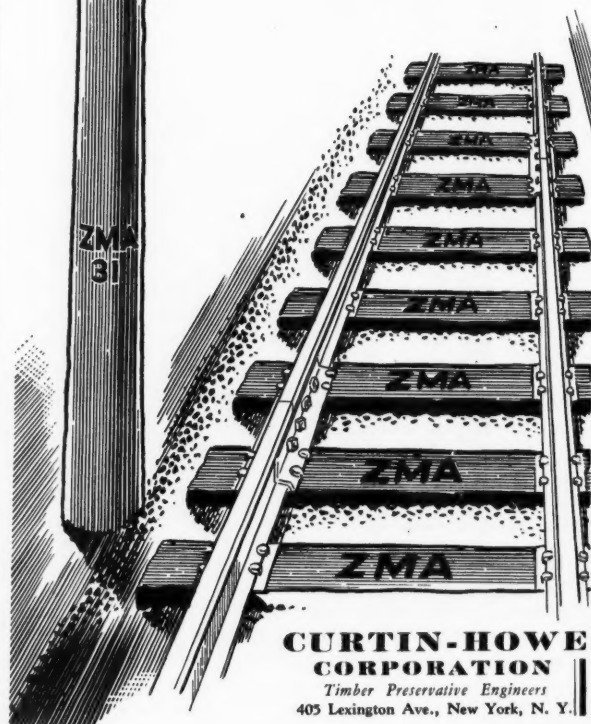
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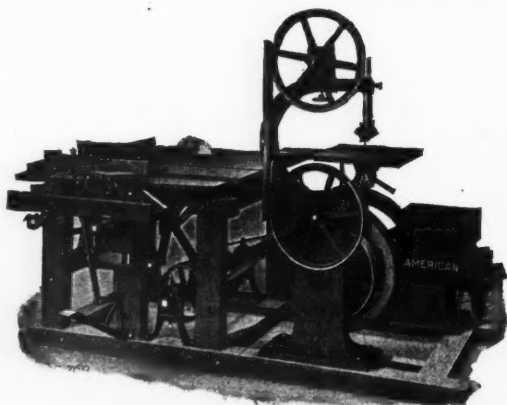
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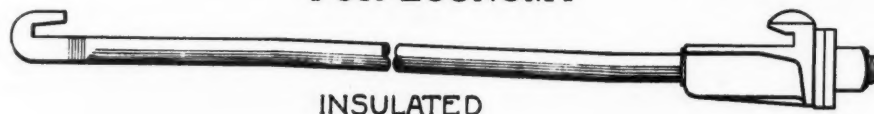
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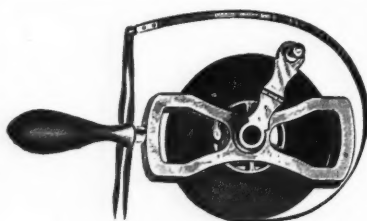
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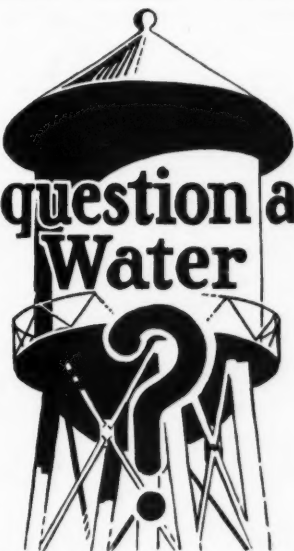
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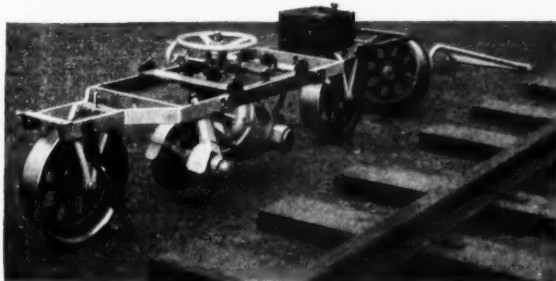
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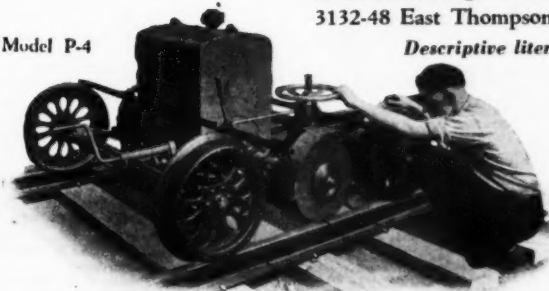
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- Rails, Tee**
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- Shovels, Gasoline Revolving**
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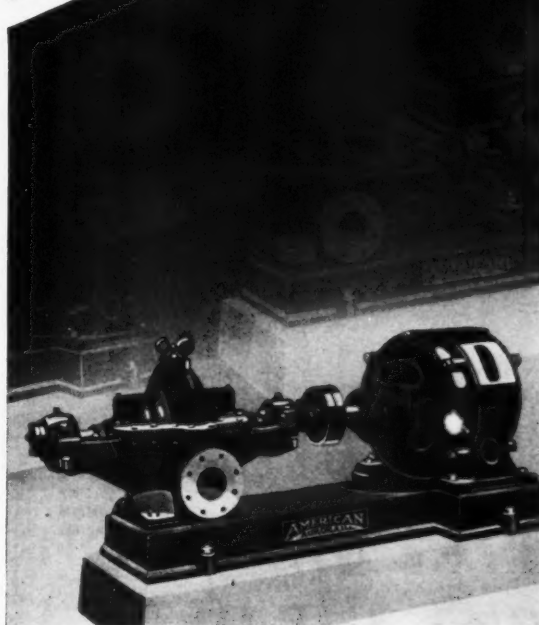
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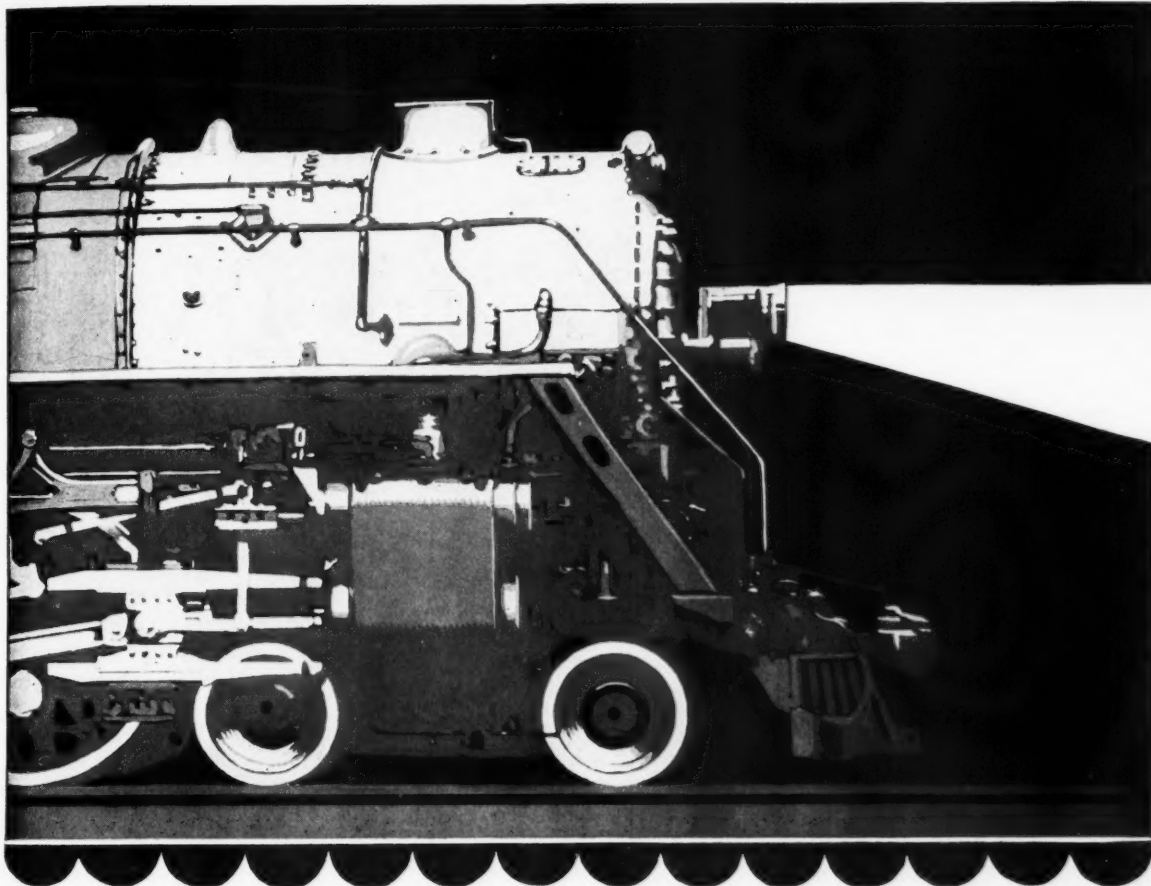
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